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BRIEFLY TOLD.

AN ECHO OF THE GAS INDUSTRY COUNCIL.—The final announcement of the dissolution of the Gas Industry Council, and in that ending bringing to us all the knowledge that the project for separate representation of the gas business at the World's Fair is beyond hope of resurrection, is at hand in the shape of a reminder from Treasurer McDonald that those who subscribed to the Fund may be fairly called upon to contribute a *pro rata* share of the expenses incurred by the Council in the instance of work performed by it. As we understand the case, the accounts which the Council have determined are a just charge upon the subscribers amount to $1,500, and at the outset we must confess to a feeling of surprise that the sum is not a larger one; for, surely, the Council as a whole was at vastly greater expense than is indicated in the total of $1,500. From our knowledge of the number of railway miles travelled by the individual members of the Council, and all gone over in the performance of the Councilmanic duties, we do not believe we would be wide of the mark in saying that railway fares alone absorbed quite as much money as that which the Council now asks for. However, as they are the ones who are to fix the "just charges," we feel certain that every subscriber to the Fund will coincide in the statement that they have been decidedly generous to the subscribers in striking a trial balance. The only charges made are for architects' fees, printing, stationery, postage, telegraphing and so on. Of these the charge to architects' account is by far the largest, although even of that item it may be truthfully said that it is very small in proportion to the value that was secured. In fact, so thoroughly had this detail been attended to, that, had it pleased the industry to have subscribed the amount necessary for the construction of the proposed building, working plans of the latter could have been made ready in a week from the time the money was secured. Three or four separate general plans were obtained, and all from men eminent in their profession, and it need not be here stated that the portion of the $1,500 represented by the allotment for preliminary construction account is very small; for it is recognized by all who have had to do with building that the architect is worth his hire. Not to dwell too long upon this subject, since reference to it now is likely to lead to thoughts of what might have been, Treasurer McDonald's call amounts, roughly, to a payment about equal to 2½ per cent. on each individual subscription pledged; and we make no doubt that the subscribers will agree that the work of the Council, which was vastly greater and more perplexing than most of those who watched its proceedings only in a general way will credit, was performed in a most generous spirit. The members are entitled to the heartiest thanks of those in the gas industry who thought that that industry would in a material sense be advanced by a separate representation at what bids fair to be the greatest World's Fair that history has record of.

A DOG IN THE MANGER, AT WESTBORO, MASS.—In our current item columns will be found some mention of an ordinance granting to Mr. Henry S. Jackson and others a franchise for the operation of a gas works at Westboro, Mass., and the proceedings that led up to the obtaining of the grant were in every sense regular and legal. Further, no particular opposition was made by any one in the borough to the scheme for inaugurating or placing a gas company at Westboro until the Selectmen had indorsed Mr. Jackson's application. Then the proprietors of the Westboro Electric Light and Power Company, becoming apprehensive of the situation, thought it was time to assert themselves, for the newcomer might interfere with their control of the artificial lighting situation, the needs of which had been poorly catered to by the electricians. They asserted that they were the incorporators (in 1890) of the Westboro Gas and Electric Company, which was organized for the express purpose of taking over the property of the Westboro Electric Light and Power Company, and of adding to the working possessions of the latter a gas works. In the meantime, that is, between March, 1890, and the present time, no steps had been taken to complete the objects for which the Gas and Electric Company had been put in the field. This apathy is now explained on the ground that "through an informality" in the

calls for the meetings (1890 and 1891), at which the merger was to be ratified, the "matter was left open till the annual meeting of the Company, to be held in October, 1892," when the project was to have been formally completed. Of course, disinterested parties will draw conclusions over this style of reasoning that will not inure to the credit of the "merger people" as to their good faith, and it may be taken for granted that the proposition to engage in the gas business would have suffered in October, 1892, from the same taint of "informality" that afflicted it in 1890 and 1891, had not Mr. Jackson appeared on the stage this summer. The electricians at Westboro have, like other blowhards, who end in believing a yarn that they originally told as a yarn pure and simple, finally worked themselves up to the point of considering their gas works a *bona fide* affair, and assert that they will appeal to the State Board of Gas and Electric Light Commissioners; for, say they, "the law provides that wherever one gas company *exists*, the Selectmen shall not grant the right to another company, only upon public hearing." This Westboro example of itself is only a small matter, but it serves to point out that scores of similar situations, in principle, exist in the United States, and exist greatly to the detriment of the new growth of the gas industry, and greatly to the inconvenience of the residents. A few years ago, in the craze of small towns to have the electric light, charters were recklessly awarded for the operation of combined electric and gas plants, the main—in fact, the sole purpose—of the possessors of which was to exploit the electric light, reserving the gas section of their grant merely as an insurance against other exploiters who might in the *future* desire to take up the supply of gas. When such make their appearance the electric-gas combination has but to show its "ordinance," to the great discomfiture of the newcomers, who usually know that capital is easily "chilled." Thus doubly armed, the electricians go on milking the residents to the full, by supplying them with an incandescent electric lamp light that is as to a good gas light as one is to four.

SOMETHING THAT EXPLAINS ITSELF.—The following letter to the JOURNAL, written by Mr. Henry Padan, President of the Portsmouth (Ohio) Gas and Electric Company, under date of August 23d, explains itself: "Mr. T. A. Bates, Secretary and Superintendent of our Company, having chosen to leave our employ, I desire to express publicly this Company's appreciation of his services in its behalf. He has shown skill, tact and economy in the management of its affairs, with a very considerable knowledge of the duties involved. Without any desire to detract from others, I can say this Company has never had better success than under Mr. Bates' management, and it was with regret that we accepted his resignation."

NOTES.—An odd criminal case is reported, from Newark, N. J., where some days ago I. R. Ketcham was held in bail for the grand jury, charged by Edward Hirsch, who occupied a flat in the same apartment house with the complainant, with larceny. Complainant alleged that Ketcham, by means of a surreptitious connection with the gas service of the former, obtained his supply of light without paying therefor. ——The works of the Goshen (Ind.) Gas Light Company were badly wrecked by a gas explosion that occurred about 10 days ago.——The Eureka Gas Company, to operate at Arcanum, Ohio, has been incorporated.——The City Council, of Concord, N. H., has decreed that hereafter the street lamps shall be kept alight all night and every night.

The Market for Gas Securities.

There is nothing of importance to report in connection with sales of gas shares in this city, for the past week, prices having been fairly well maintained in spite of the ruling dullness of the time under review in the general share market. Consolidated did not go below 117, the bid price at the opening to-day (Friday) being 117¼. In spite of the lack of transfers, however, we have no doubt that the suggestion made in this column more than once of late, that an order for the purchase of 500 or 1,000 shares would not be filled before 120 had been paid for some of them, remains good. The passing by the Standard Company of the dividend on the preferred for the last regular term has occasioned much inquiry, but it looks to us, under the circumstances, to be in keeping with safe financial policy, and is further evidence of the desire of the proprietors to steer clear of the financial skyrocketing that was from time to time so marked a feature of the old management.

Brooklyn shares are absolutely featureless; and, in fact, the only marked movement in the situation was shown by Chicago gas, which sold at 83 and over during the week. Baltimore Consolidated is steady, at 61 to 61¼. Laclede maintains its quotation of 24¼ to 24½, and Bay State gas is not in great demand at 56 to 57. We believe it would be good policy to take a profit in any Brooklyn holdings, for these undoubtedly will be lower in the near future.

[Translated for the JOURNAL, from the *Chemische Industrie*, by Mr. Herman Poole.]

Sulphocyanic Acid and the Sulphocyanides in the Manufacture of Illuminating Gas.

The dry distillation of coal, according to Mr. J. V. Esop, produces, besides ammonia, hydrocarbons, phenols, etc., a class of nitrogenized bodies, cyanogen and its derivatives, and in an important quantity. De Romilly explains the formation of cyanogen by the action of ammonia on the carbon heated to redness. We will not stop to develop and discuss this theory, our work having for its aim principally the study of the best methods of extracting the cyanogen compounds contained in the ammoniacal waters and other products of the purification of illuminating gas.

The proportion of cyanogen products depends principally on the conditions of the manufacture of the gas. It seems to increase with the quantity of coal charged in the retorts. (R. Gasch.)

As long as the gas formed by distillation keeps a temperature above 212° F., the cyanogen and the ammonia remain dissociated; but as soon as the temperature falls below 176° F. in the purifying apparatus, chemical or mechanical, cyanides of ammonium are formed: the sulphocyanate and ferrocyanide being produced from contact with the salts of iron in the purifying mass.

In the ammoniacal waters from the gas works at Weisbaden, Karlsruhe, and Mayence, which distil coal from the Saar and Ruhr districts, the author found, respectively—

Sulphocyanic acid.....	18.79— 23.35— 35.88 grains.
Ammonia.....	278.55—299.8 —556.25 grains.

In the purification products (Laming or analogous mixtures) we have found the following proportions for 100 parts:

Sulphocyanic Acid. CNSH.	Ammonia. NH_3.	Ferrocyanide of Potassium. $FeCy_6K_4+3aq$.
0.39	0.49	3.02
0.30	0.39	5.00
0.32	0.40	4.62
0.85	1.03	3.51
0.94	1.02	3.42
1.09	1.05	3.42
1.62	2.06	4.42
1.06	1.13	4.03
1.98	2.31	4.51
3.53	3.21	4.84
2.32	3.05	3.05
2.53	1.28	1.28
3.72	4.53	4.53
4.25	4.38	4.38

On an average, the waste purifying mass contains more sulphocyanic acid, and in a greater condition of purity, than the ammoniacal liquors. In both products the acid exists besides in the state of an ammoniacal salt.

By a methodical extraction of the purifying mass, and concentration of the leachings, it is generally easy to obtain crystallized sulphocyanate of ammonia. It is advantageous always to isolate the sulphocyanic acid by means of a copper salt, if the leachings are impure or weak.

The ammoniacal and copper salts are the first products from which chemical industry prepares all the other cyanides.

It is easy to transform the ammonia sulphocyanate into a sulphocyanate with a fixed alkaline or earthy base. It is sufficient to displace the ammonia by the hydrate or sulphide of the base.

As regards sulphocyanate of copper, the alkalies decompose it only very incompletely; but by means of soluble sulphides we are able without difficulty to prepare the corresponding sulphocyanates with the total transformation of the copper to sulphide.

Besides, even in the manufacture of the sulphocyanates of sodium, potassium, calcium, or barium, by means of the ammonia salt, it is advantageous to make use of the sulphides on account of their cheapness. By this means lighter colored sulphocyanates are obtained than with employing the hydrates.

By means of sulphocyanates of the alkaline earths, which are easily purified because of their great tendency to crystallization, the salts of all the other bases having soluble carbonates or sulphates are prepared; such are sulphocyanates of potassium, ammonium, aluminum, etc.

We know that the sulphocyanates are decomposable at the temperature of evaporation (194°–212°) of their aqueous solutions under ordinary atmospheric pressure. The loss is appreciable, especially for the ammonia salt. Concentration under reduced pressure gives better re-

sults. It is observed, also, that slightly acid solutions decompose less than neutral liquors, other conditions being the same.

Before passing to the details of the preparation of the different sulphocyantes, we will say a few words on the conditions necessary to keeping the purifying mass.

These keep their strength in soluble salts only if stored in covered places, in layers not too thick, and at low temperatures. If, for any reason, they are exposed to a temperature above 60°–70°, their green color passes to a reddish one at the surface; a piquant, acid odor is given off; and, little by little, the decomposition proceeds towards the deeper layers, till in the space of a few days the sulphocyanate is almost completely decomposed.

With thick layers, the oxidation generally begins in the interior of the mass; the temperature rises to 85°–105°; the odor, at first ammoniacal, becomes sharp and acid. At times the oxidation is brisk enough to set fire to the sulphur.

Under these circumstances the sulphocyanate is transformed partly into ferrocyanide, partly into volatile compounds, which escape; the sulphuric acid formed from the oxidation of the sulphur unites with the ammonia. The mass thus oxidized is richer in ferrocyanide and sulphate of ammonia; it contains only very little sulphocyanate—about one-half per cent.

The sulphocyanate of ammonia is usually contained in the spent mass in the form of minute crystals, distributed very irregularly. They are often found in small, rather hard pieces, hardened sometimes by moisture, sometimes by enclosed tar particles. For a good extraction, it is well to work over the dry mass in such a way that the water may penetrate perfectly and completely remove all the soluble salts.

Cold water is used for extraction, allowing contact for a sufficient time. The insoluble residue is pressed, and, if necessary, digested in a new quantity of water, which will serve to treat a new, fresh mass (methodical extraction). If it is desired to extract at a single treatment the sulpho- and ferrocyanide, alkaline leaches are used, which dissolve not only the last salt, but, in addition, make soluble a portion of the insoluble sulphocyanides contained in the mass. In this case, closed vessels and a heat of 140°–170°, with an arrangement for saving the ammonia which is evolved copiously, are used. It is necessary to observe here that the leaching liquids ought not be too concentrated or too warm, nor contain a large excess of alkali, so as not to induce the formation of soluble polysulphides at the expense of the free sulphur and the practical decomposition of the sulphocyanate.

According to the method of working, the leachings are colored a clear yellow, a greenish yellow, or a blue. The alkaline liquors are usually the strongest colored.

The specific gravity of the extracted aqueous liquors varies from 1.028 to 1.113, with a mean of 1.070 to 1.085. If their strength in foreign salts, chlorides, sulphates, sulphites, etc., is relatively weak, all that is needed is evaporation and fractional crystallization. If the liquors are very impure, the sulphocyanic acid is separated by means of a copper salt, usually the sulphate, which causes the formation of insoluble sulphocyanate of copper. By reason of the presence of iron in the sulphate of copper employed the liquor is colored dark red; it is decolorized gradually when sulphurous anhydride is added to reduce the cupric to a cuprous salt.

The very dense precipitate of sulphocyanate of copper deposits rapidly; it carries with it a small amount of sulphides and the empyreumatic substances in the liquor. This last contains now only chlorides, sulphates and sulphites, with traces of organic bases, and is rejected.

The ammoniacal liquors may be treated similarly, but when they contain less than 2 per cent. of sulphocyanic acid there is no use trying to extract it.

The extraction by means of copper salts offers certain advantages over simple concentration and crystallization. There is no loss, all the reactions taking place in the cold. Besides, the products obtained are less highly colored and more easily purified.

The sulphocyanate of copper, washed by decantation, is transformed into an alkaline or earthy salt by digestion with a solution of the corresponding sulphide. The empyreumatic substances and the organic pigments carried down by the copper sulphocyanates remain insoluble with the sulphide of copper. In order to have the transformation complete the alkaline sulphide must be in great excess; good results are obtained by treating the copper salt obtained from a previous extraction with fresh liquor of the soluble sulphide, which is then passed to the sulphocyanate of copper obtained from a succeeding operation, and so on. The sulphide of copper, freed from the sulphocyanate, is washed, dried and roasted in a pyrites furnace for making sulphuric acid; the mixed oxides are attacked by warm, dilute, sulphuric acid; the same quantity of copper thus serves indefinitely, the only loss being that due to waste in handling.

The crude sulphocyanate of ammonia is obtained as above mentioned by evaporating the leachings from the waste purifying materials. These are generally clear yellow in color, and darken more or less during the evaporation. When a strength of 22°–24° B. is reached they are allowed to crystallize. On cooling rhombic crystals of sulphate mixed with sulphocyante of ammonia are formed. The mother liquors are concentrated, and in the succeeding crystallization are formed large flakes, containing 80 to 90 per cent. of sulphocyanate of ammonia, colored light yellow. The brown mother liquor is added to the leach liquors of a subsequent operation. After recrystallizing the crude salt, and removing by means of sulphide of barium the iron and sulphate of ammonia, commercially pure sulphocyanate of ammonia is obtained. To prepare the salt chemically pure the sulphocyanate of baryta must be removed. This is decomposed according to the following formula:

$$(CNS)_2Ba + (NH_4)_2SO_4 = 2NH_4CNS + BaSo_4.$$

The sulphate of baryta is separated by filtration and the liquor evaporated to crystallization under reduced pressure. It is necessary in all these operations to carefully avoid contact with iron or other metals and to operate in enamelled dishes, presses of wood, etc.

Sulphocyanate of baryta is prepared by agitating hydrate or sulphide of barium in solution of sulphocyanate of ammonia. This is done in closed vessels provided with agitators, and at a temperature of 175° to 195°, obtained by injection of free steam. The ammonia or its sulphydrate should be distilled as rapidly and completely as possible in order to reduce the loss to a minimum. A large excess of sulphide of barium must be avoided.

Sulphocyanate of baryta is prepared also in the cold and without loss by means of sulphocyanide of copper and sulphide of barium. The crude sulphocyanide of copper may be used as obtained above, after washing and pressing several times. This salt is suspended in a solution of sulphide of barium of 15° B. It is well to treat fractionally by mixing the copper salt with an insufficient quantity of sulphide of barium; the barium salt is then completely transformed into sulphocyanate. The sulphocyanide remaining in the sulphide of copper is then decomposed by action of a fresh leach of sulphide of barium. After precipitation of the foreign metals and the excess of sulphide of barium which the liquor contains, it is concentrated in dishes at a temperature of about 140°. Fine, slightly-colored crystals are thus obtained.

Sulphocyanate of calcium is obtained by treating the ammonia salt with caustic lime. To have the salt nearly pure, it is necessary to use the ammonia salt purified or the leachings very slightly charged with empyreumatic products, or foreign salts. The operation should be conducted rapidly and with just the proper quantity of lime, since an excess of this lime, as well as of ammonia salts, causes troublesome decompositions. The liquor is concentrated to 45° B. On cooling, well-formed needles separate, which break easily and take on a slight color after straining and exposure to the air.

Sulphocyanate of potassium is obtained by double decomposition of a sulphocyanate of an alkaline earth and sulphate or carbonate of potassium. Liquors sufficiently strong to have the filtrate 15° to 20° Beaume should be used. Evaporate to 45° Beaume and allow to crystallize.

Sulphocyanate of aluminum is prepared by means of sulphate of aluminum and sulphocyanate of calcium or barium. Use the salt of barium at 40° B. and the calcium salt at 36° B. It is necessary that the sulphate of aluminum be free from iron and to use as concentrated a solution as possible, 28° to 30° Beaume. The operation is performed in the cold, filter and press avoiding always contact with objects of iron. A solution of 19°–20° B. gravity is thus obtained sufficiently strong for use in printing.

As apropos to this communication of Mr. Esop, we may add the following passage from an article by Playfair, on "Notes on the Production of Cyanides," which appeared in the *Journal of the Society of Chemical Industry:*

"The sulphocyanides may be manufactured directly, or may be obtained as by-products in gas making. Dr. Lunge states the amount of sulphocyanide of ammonia in English gas liquors at about 25 pounds per 100 gallons.

"In no gas liquor, of which I have been able to get samples, has the quantity reached anything like that figure. In Scotch gas liquor, after it has been treated for the extraction of ammonia, I have found only 1 pound of sulphocyanide of lime per 100 gallons. The refuse lime from gas purifiers contains sulphocyanides—larger proportion, but even this gas lime from Scotch gas works I find to contain under 20 pounds of sulphocyanide of lime per ton. In gas lime there is a large amount of hyposulphite of lime, which would require to be entirely removed from

the sulphocyanide, as the presence of oxygen compounds is prejudicial to the formation of cyanides from sulphocyanides. The small quantities in gas residues above mentioned are not worth the cost of recovering; so it is preferable to make the sulphocyanides by direct processes."

How to Keep Down Complaints and Grumbling Amongst Consumers.

[A paper read by Mr. GEORGE KEILLOR, of Nairn, before the North British Association of Gas Managers.]

On being asked to prepare and read a short paper at this meeting, it occurred to me that the subject given in the title was one with which we are all more or less familiar. And I trust that, notwithstanding any shortcomings in the paper on this rather dry subject, it will be made thoroughly interesting and beneficial by the discussion which may follow.

We have of late been so accustomed to hear what I would call very scientific papers, that one is almost afraid to lift his voice on any of the lesser subjects appertaining to our business. But I think there is just a possibility of harping too much on the scientific strain; and while continually searching for something new and of great magnitude, the minor details connected with the manufacture and distribution of gas are apt to be forgotten. Consequently, we have few homely discussions on every-day troubles and experiences. From such discussions a real mutual benefit is derived; and it may be said that, like the good done to the old parent when indulging in the frolics of the young, so would our "parents" in the gas trade be benefited by a rehearsal of old but good matter. At the same time, I feel sorry that I am unable to contribute anything worth while or new; but, with your kind indulgence, I will shortly give you a few practical thoughts and experiences as to the duties of a meter inspector, with some of the troubles that most, if not all, gas managers have to meet. These troubles usually happen at a time when we are in the midst of a quarterly survey; and while trying to give satisfaction all round, with great expectations of big returns being recorded, we now and again hear of grumbling amongst consumers, and (worse still) that this one and that one are taking to oil.

Like most of you, I have had ample opportunity to study how best to retain the confidence of consumers by keeping down and attending to complaints, and trying to maintain the position of gas as an illuminant, so that oil lamps, which are now most formidable opponents, will be prevented taking its place. To overcome these complaints is, I consider, one of the first questions affecting the interests and good management of all modern gas works. When Mr. Newbigging gave the four "Golden Rules" to gas managers which are now so familiar to all of us, I think he might have added a fifth; and it might have been this: "Let your meter inspector be a man of sound mind and judgment, thoroughly trained in the distribution of gas, and able to discuss with consumers *on the spot*, in a courteous manner, everything connected with gas supply, to hear their complaints quietly, say nothing but what is absolutely necessary, and certainly never show the least ruffle of temper or any unnecessary independence, after which make it a point to quiet the grumbler by, if possible, removing the cause of his discontent."

After 16 years' experience in this capacity, I have come to the conclusion that the real and only cure for this epidemic of grumbling, is that the meter inspector must deal with all complaints on the spot. Of course, he must be able to use his own discretion as to the nature of the complaint, and whether he can put right what is said to be wrong just at that moment, or whether he must take in the complaint to the office to be attended to by an official kept for this kind of work. Or it may be that a local plumber must be called in; but whatever means may be taken, or at whose expense, nothing must be left undone that, in reason, will satisfy the consumer. And whatever or by whom it may be done, let it be superintended by the gas official; for who has greater interest in the gas that is being sold than the man who makes it? And is it not obviously for the benefit of all gas companies and corporations to keep in their own hands, if not the whole control of all internal fittings, at least the entire superintendence of the alterations and improvements in gas lighting when opportunities occur?

Of course, there are complaints *and* complaints, and to take all those one hears of, and deal with them individually, would occupy too much of one's time. In passing, I will only mention several, by way of proving to you the great necessity of having them dealt with on the spot, and thus prevent grumblers from having time and opportunity to go from door to door lamenting over their bad gas, their high accounts, and the dilatoriness of the gas man.

The first complaint I will mention is one that generally is easily overcome. The party who makes it seldom complains without good cause, and is found to be a reasonable person if his wants are attended to at the right time and on the spot. But should this consumer be in any way slighted, and his complaint not be attended to at once by the meter inspector, but simply told to get a plumber to change a burner or such like, reasonable as he may be, he will develop into one of the worst of grumblers. More than likely, he may be a consumer of position and influence, and consequently his word has a certain amount of weight, for a time at least, on anything connected with the gas supply, the faults of which he will expose to many sympathetic friends.

The next class of grumblers I would mention are those who go from door to door complaining of everything and everybody—in fact, this is the real grumbler in the proper sense of the term. No meter inspector will make more than two or three visits when he will find out this class of consumer, with whom he must be very careful. He should have little to say, even although the consumer makes some very ridiculous and aggravating remarks; and knowing as the inspector does the ordinary nature of affairs, and the great amount of ignorance that prevails among consumers generally, his simple duty is to try and please. When this consumer gets his account rendered, he makes it a point to have some disagreeable remarks to offer regarding the quality of gas and the price; and he never forgets to tell you that he has used less gas this quarter than he ever did before, that the light is much worse, and the account is much higher, etc. He then takes you into a room where the light may be bad, caused by an old burner, or a choked bracket. And while the inspector is examining the light and endeavoring to find the cause of complaint, the grumbler is all the time running down the whole system of gas lighting, and is sure to tell you that some of his friends have taken to oil, which is much better and cheaper than gas, and that he means to follow suit. Meantime, the inspector (if the man he ought to be) is having the old burner removed, and replaced with a new one, if need be, or the bracket cleaned. Then, not having spoken a word, he now lights the gas, and silences the complainer, who barely gives him time to explain the cause before hurrying into another room and asking him to look at the light there. This the inspector does, and the defect having been rectified there, he pleases the consumer almost against his will, and walks off to pursue his calling, feeling that he has at least quieted another person who, if left to himself and not attended to on the spot, would have gone about for the next three months continually grumbling over "our bad and dear gas."

During my tenure of office as meter inspector, like others I have had my troubles great and small; and I made it a point from the beginning never to take any complaint to the gas office if it could be got over otherwise by attending to it at once. Consequently, I considered at the time (and now I am more convinced of it than ever) that this was doing the right thing at the right time and in the right place. It has the effect of making consumers much more contented, besides keeping the office complaint book clear of a daily list of trifling complaints, which when read over by the manager gives him a feeling of anything but pleasure in his work.

Now I hold that every manager should provide his officials with a stock of new burners of all sizes, to be given to all-and-sundry free of charge. And all who occupy the office of meter inspector and collector, who may be the manager himself in small gas works, should be men thoroughly practical, and not only able to discuss the different systems of gas lighting with consumers, but also to be of a straightforward and courteous disposition, with a strong aptitude to do good business in a real business fashion. There are, I am afraid, some managers who, while always trying to keep the good opinion of their directors or committees, are for ever telling them of the little troubles they have with consumers. I consider consumers more our masters in this respect than our directors or corporations. I say, please consumers, and do good business with them; and you cannot fail to satisfy your directors. On the other hand, the gas manager by talking to, and informing his directors of all the trifling complaints and troubles connected with this consumer and the next—instead of using his own discretion and dealing with all complaints on the spot—is simply heaping fuel on the fire; for do the directors not take up the question at their first meeting and more than likely instruct the manager not to interfere with any burners or internal fittings whatever? "Tell the consumer," they say, "to get a plumber." Now there are not a few gas works managed on this principle. The manager ought to be able not only to manage the gas works, but also his directors and all the consumers. Where the latter are not attended to and satisfied, and the manager is interfered with by his directors (such interference caused very likely by himself at the outset, asking them to do and decide what he himself ought to do), I consider

that both manager and directors in this case are slowly committing the suicide of their company. Directors and committees have plenty to do in looking closely after the financial department, without being in any way troubled with affairs affecting the management. There was a time when gas works officials were very independent—I have no doubt too much so; but since the "light without a wick" was shown in 1792 and its subsequent development, oil lamp manufacturers have not been idle. In the age we live in, the gas man's independence is not how much superiority he can show over others, but only the independence gained by being able to satisfy the consumer with his goods. In old times, consumers were pleased and almost obliged to stoop to the gas official; but how does this compare with the present day? Why, the consumers are now the masters; gas companies are the servants, and have to satisfy them. If not, other illuminants are not far to find.

It may be asked, "how can a meter inspector have time to deal with such matters when on his inspection, and how is it possible to satisfy every person?" In this question lies the whole problem. But it is a problem I am convinced it will pay to solve, and one which after all is not very difficult of solution. It would no doubt add a few days, or even a week, to the time in making the survey; but is it not a fact that this man is by the aid of the meter selling our stock? Who can blame a consumer, when purchasing his light, for complaining if need be? And who should attend and put matters right sooner than the meter inspector who, as it were, represents the gas company? This official, however, too often without giving the least attention to the consumer's wants—far less to the interests of his company, being hard pressed to finish his meter reading—gets out of it by simply telling the customer to engage a plumber. Consequently the consumer, rather than be troubled with plumbers about the house, puts up from time to time with affairs as they are, only with this difference, that the longer the matter is deferred, the greater will be the grumbling.

Take, for example, a case that came under my own notice some years ago, where the lady of a large boarding house in Nairn, on getting her account, looked at it and exclaimed, "Well, I have often heard that gas men go about from door to door cheating and putting down in their books whatever they thought fit; but I am now thoroughly convinced of the truth of it. For why, this account is double what it ever was before, and I never had so few visitors. I will go to the chairman of the gas company and expose the man." After my assistant came in and informed me of this state of matters, I made my way to the lady's house, and on getting there she had a great deal more to say to me than I would care to repeat. I was told that I was not wanted any more, and not to enter her house again unless sent for. She informed me that she was going into town that day to order oil lamps. I expressed my sorrow at losing a good customer, especially when the fault was not ours, and I hoped that before leaving us she would allow me to make a proper examination of the meter and piping in the house. "I tell you," she replied, "that I want nothing more to do with you. I had a plumber, who examined all my fittings both for water and gas, and prefer to believe him." This was said while she was going towards the door, making sure she would see me out without more to do. But, just before going, I made another effort to impress her with the fact that whatever was wrong could be put right. So I remarked that there must be a very great leak going on in the roof of the house, passing away unobserved through the slates, and should an explosion take place when her house was full with visitors, the result might be serious. The word "explosion" had the desired effect. She became calm, and we had some sensible talk together, and, on taking a quarter of an hour reading of the meter, a very large leak was shown to be going on. I explained this to the lady, got the leak stopped, and told her that I would bring her case before my directors, with the view of getting the account reduced. Ultimately the amount was reduced by one-half; and this, I am pleased to say, satisfied the lady, and had the effect of preventing the order for oil lamps being given, besides restoring confidence in gas once more.

No doubt most of you will have had similar cases, and may think me taking up too much of your time in rehearsing same. But what I wish to point out is the good it does to attend to such cases *at once*. In this case I had a thorough business lady to deal with. She, no doubt, when warm on her grievance, had made extravagant and strong assertions. Ladies are inclined to use strong language when they feel annoyed. But had I left her for a few days, with instructions to get a plumber to examine her fittings, I have not the least doubt the order for oil lamps would have been given. We would also have lost a good customer and gained a bitter and influential opponent.

Experience, after all, is best for teaching people, and I have endeavored to give you a page from mine. Competition in lighting is increasing, as with everything else; and to please our customers our representatives must be courteous, long-suffering, patient and practical. If we can show the grumbler that we have done our best for him, he must in his calm moments admit that we can do no more, and should think well of us for having attempted so much.

Elliot's Apparatus for Manufacturing Gas.

On the 16th inst. U. S. Letters Patent (No. 480,919) were granted to Mr. Walter P. Elliot, of New York, for an improvement in apparatus for manufacturing gas. Using the words of the specification, Mr. Elliot says:

In the accompanying drawings, Figure 1 is a plan view of apparatus adapted to carry out my improvement. Fig. 2 is a side elevation of the same. Fig. 3 is a horizontal section of a portion of the apparatus, taken on the line x x, Fig. 2. Fig. 4 is a vertical section of a carbureting and fixing chamber employed, taken on the line y y, Fig. 1. Fig. 5 is a vertical section of the same, taken on the line z z, Fig. 1. Fig. 6 is a vertical section taken on the same line as Fig. 4, but showing a slight modification. Figs. 3, 4, 5 and 6 are drawn to a larger scale than Figs. 1 and 2; and Fig. 6 is somewhat broken away. Similar letters of reference designate corresponding parts in all the figures.

In carrying out my improvement I first cause a fire of some suitable carbonaceous material to be started in one or more producers, the combustion being accelerated, when desired, by a blast of air or air and steam. The resulting gaseous products are conveyed through a suitable outlet to a superheating and fixing chamber, which may also be a carbureting chamber, where sufficient air is admitted to produce proper combustion of the gases. The gases are caused while in a state of combustion to pass about the exterior of tubes or retorts arranged in the said chamber, thus heating said tubes or retorts to a high temperature. When the materials in the producer or producers have acquired a sufficient temperature to dissociate and farther on decompose steam, the supply of air or air and steam is cut off, the outlet for the products of combustion is closed, and an outlet for gas is opened. Steam by itself or in combination with the gaseous products from one or more producers, or in combination with the products of distillation of carbonaceous or hydrocarbonaceous material, or steam in combination with the gaseous products from one or more producers and the products of the distillation of carbonaceous or hydrocarbonaceous material, is then admitted to the producer or producers, previously heated, as above referred to. After passing through the above referred to heated producer or producers the gaseous product is conveyed away to the aforesaid tubes or retorts arranged in the chamber. The temperature of the said tubes or retorts is sufficiently high to preheat and superheat the base gas passing through the tubes or retorts, so that when the base gas comes in contact with carbureting material, should such be used in the tubes or retorts, its temperature will be sufficiently high to materially aid in the destructive distillation of the carbureting material and, should steam be used, to decompose it. The temperature of the tubes or retorts is also sufficiently high to decompose hydrocarbonaceous material.

During the passage of the gas through the tubes or retorts it is carbureted or not, according as it is desired to make illuminating or heating gas. If carbureted, such carbureting is effected by the addition of the products of distillation from liquid hydrocarbon, bituminous or cannel coals, shale, or any suitable carbonaceous material. In the manufacture of heating gas steam may, if desired, be introduced to the tubes or retorts. The gas in its further passage through the tubes or retorts is converted into a fixed gas and issues from the tubes or retorts into the hydraulic main, and thence passes into and through the scrubbers, condensers, purifiers, etc., in the usual way.

A designates producers, of which I have shown four, but of which I may use one or any desired number. These producers may be of any suitable construction which adapts them for the production of gases. I have shown them as circular and provided upon their tops with manholes, *a*. Any suitable carbonaceous material—such, for instance, as coal, either bituminous or anthracite—having been placed in one or more, as desired, of the producers, the same is ignited in any well known manner. Air or air together with steam is then introduced, preferably in the form of a blast. The air, as shown, is delivered in the direction of the arrow 1, Fig. 1, through the pipe *B*. From the pipe *B* extend branch pipes *b* and from the branch pipes *b* other branch pipes *b'*. The branch pipes *b'* communicate with the interior of the producers. Each of the branch pipes b' is provided with a stopcock b^3, by which the flow of air to the producer may be regulated, or in the case of steam and air being used the flow of steam in like manner can be regulated by a stopcock, b^3, or both steam and air may be wholly discontinued from any of the producers, as desired. The air may issue to the producers beneath

the body of coal or directly against the body of coal, or when air and steam are introduced together both may thus be admitted.

Extending from the producers are pipes *C*, provided with stopcocks, *c*. These pipes communicate with a stand-pipe or stand-pipes *D*, which stand-pipe or pipes are provided with stopcocks *d d'*, the former above and the latter below the point of connection between the pipe *C* and the pipe or pipes *D*. The pipe or pipes *D* communicate at their lower ends with an accumulator *E*, in the form, as here shown, of a horizontally extending pipe, and at its or their upper end or ends with an accumulator *F*, also in the form of a horizontally extending pipe. The

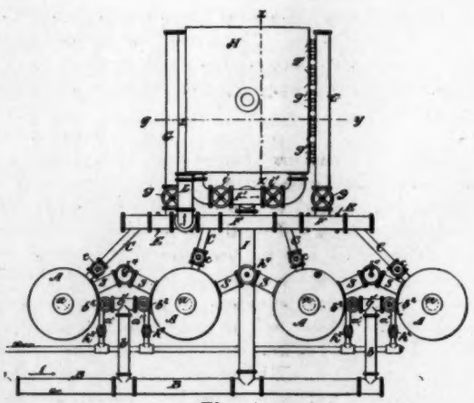

Fig. 1.

accumulator *E* communicates with distributers *G* in the form, as shown, of horizontally extending pipes, which distributers are provided with stopcocks *g*. From the distributers *G*, in this instance, extend a number of pipes *g'*, which pipes extend to the interior of a chamber *H*, near the bottom of the latter. The chamber *H* is a superheating and fixing chamber; but it may also be a carbureting chamber. The gaseous products from the producer or producers pass therefrom through the pipes *C* to the pipe or pipes *D* and thence to the accumulator *E*, the stopcock or cocks *d* having previously been closed to prevent the passage of any of said products to the accumulator *F*. From the accumulator *E* such products pass through one or both of the distributers *G*, and thence through the pipes *g'* to the interior of the chamber *H*. I desire that, when the gases thus enter the carbureting or fixing chamber, sufficient air should be admitted to produce proper combustion. For this purpose I, as shown, cause a portion of the air entering through the pipe *B* to pass through a pipe *I* to a pipe *I'*. The pipe *I'* is provided with cocks *i i'*, one upon each side of the point of connection between the pipes *I I'*. The pipe *I'* communicates with the chamber *H* near the bottom and upon both sides of the latter. As shown, said pipe connects with chambers i^3, extending lengthwise of the chamber *H*. Opening from said chambers

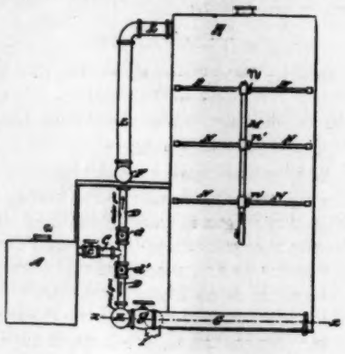

Fig. 2.

i^3 are tuyeres i^4, which tuyeres are adjacent to the inner ends of the pipes *I'*. The air thus introduced through the tuyeres will commingle with the gaseous products entering through the pipes *g'* and produce a proper combustion of said products. The chamber *H*, I have shown as having near its bottom an open portion *J*, in which are arranged a number of piers *j*. Between the piers *j* extend arches j^2, as shown more clearly in Fig. 5. These piers and arches support a number of tubes j^3 (shown more clearly in Fig. 5), which tubes constitute retorts.

I have shown the chamber *H* as divided vertically by a partition wall *h*, so that there are in effect, in this example of my improvement, two compartments to the chamber, to one or both of which the gaseous products, just described, may be delivered from one or more producers through the distributors *G*, arranged upon opposite sides of the chamber. This may be accomplished by operating the stopcocks *g* and *i i'*.

The pipes j^3 are preferably of refractory material—such, for instance, as fireclay—and are separated from each other in such manner as to afford clear spaces about them for the passage of the gases in a state of

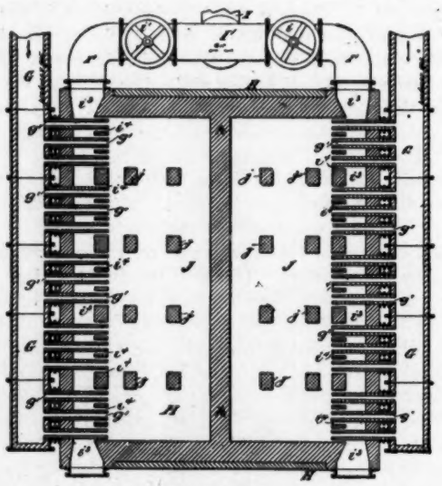

Fig. 3.

combustion. I have shown them as arranged in rows extending widthwise of the carbureting and fixing chamber, and as separated from each other and supported by means of blocks g^4, which blocks are made, preferably, of refractory material—such, for instance, as fireclay. The burning gases in their upward passage through the chamber *H* are caused in this illustration of my improvement to pursue a circuitous course about the pipes j^3, by means of deflector plates *K*, which deflector plates alternately abut near one of their ends against the wall of the chamber and against the partition wall, those abutting against the wall of the chamber not extending quite to the dividing partition wall *h*, and those abutting against the partition wall not extending quite to the op-

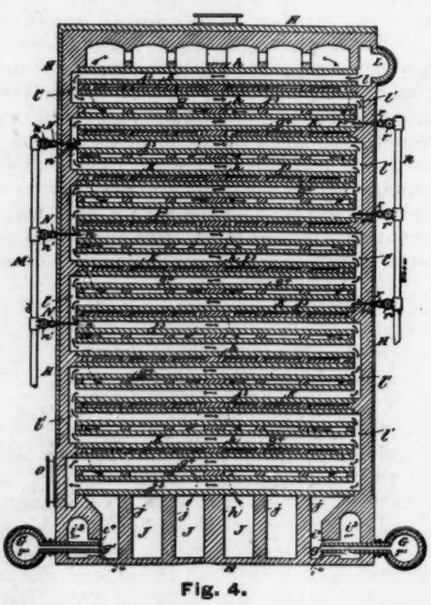

Fig. 4.

posite wall of the chamber. The course of the gases is shown more clearly in Fig. 4 by the arrows in dotted lines. This upward movement of the gases in a state of combustion heats the pipes or retorts j to a high temperature, the degree of which has been previously described. The pipes or retorts j^3 having been brought to the proper temperature, one or more of the cocks *d'* may be closed and one or more of the cocks *d* opened. At the same time certain of the cocks b^2, by which air is admitted to the previously heated producers, may be closed. To the producers from which air is cut off steam by itself or in combination with the gaseous products from one or more producers or in combination

with the products of distillation of carbonaceous or hydrocarbonaceous material, or steam in combination with the gaseous products from one or more producers and the products of the distillation of carbonaceous or hydrocarbonaceous material, is admitted from branch pipes a' or b, cocks h^3 h^4 therein being opened, so that steam or the other products described may flow directly into the producer or producers. The steam or other product passes upwardly through the incandescent mass of coal in the producer or producers and is combined, dissociated, or decomposed, according to the product thus introduced. The gaseous product thus produced then passes through the pipe or pipes C and the pipe or pipes D to the accumulator F, and from thence through a pipe L to the upper portion of the chamber H.

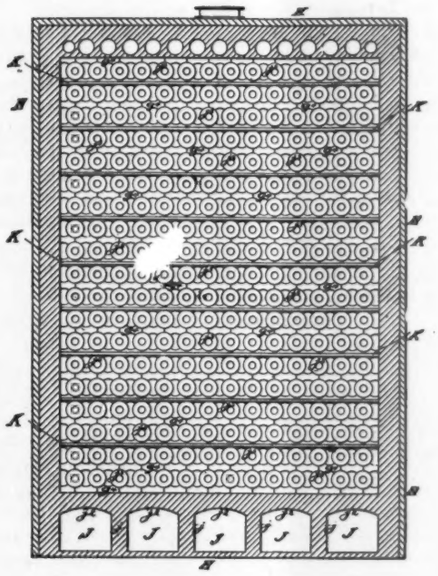

Fig. 5.

I have shown the pipe L as extending along one side of the said chamber near the top thereof, and in open communication with a chamber l, formed in said chamber H. The upper row of the pipes j^3 open at one of their ends into the chamber l. The gas passing through the pipe L is, therefore, delivered into the said upper row of the pipes j^3.

Referring more particularly to Fig. 4, it will be seen that passages l' are formed in the side walls of the chamber H, by which communication is afforded from the row or rows of pipes above to those below. These openings are so arranged relatively to each other upon opposite sides of the chamber that the down-flowing gas will be caused to pursue a circuitous course to and fro through the pipes from side to side of the chamber, as indicated more clearly by the arrows in full lines in said figure. The pipes, it will be observed in this instance, extend through

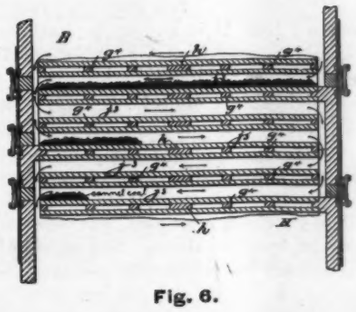

Fig. 6.

the partition wall h, and, therefore, through both of the chambers or compartments which are formed by said partition wall.

When the gas has been preheated and superheated to such a temperature in its passage through the pipes that it will decompose a hydrocarbon, I carburet the gas either wholly or in part. I have shown two means for accomplishing this result. By the means shown more particularly in Figs. 2 and 4, I cause a liquid hydrocarbon—such, for instance, as petroleum—to be injected into certain of the pipes j^3. The liquid hydrocarbon flows through a stand-pipe M, from which stand-pipe extend laterally arranged pipes N. From these laterally arranged pipes nozzles n extend through the wall of the carbureting and fixing chamber and into the ends of the pipes opposite which they are arranged. I prefer that the outlets for these nozzles shall be restricted, so that the hydrocarbon will be delivered into the pipes in the form of a spray. Cocks n' upon the nozzles may be operated to regulate the flow of the hydrocarbon.

In the other example of my improvement shown the pipes or retorts j^3 are somewhat enlarged. In these pipes or retorts I place a solid carbonaceous substance, such as bituminous or cannel coal or shale rich in hydrocarbon. The down-flowing gas passes over the beds of carbonaceous material, which of course are highly heated, and thus becomes carbureted. In fact I may use both of the means described for carbureting the gas, if I so desire. The gas in its farther passage down through the pipes or retorts becomes fixed and issues in the lower portion of the chamber through a pipe O, from which it passes to the usual purifiers, scrubbers, etc.

I may use but one of the producers, or any desired number. By using a number of the producers I am enabled to maintain a continuous process—that is to say, gaseous products from one or more of the producers having been passed to one side of the chamber H, and the pipes or retorts having been sufficiently heated thereby, the same may be turned off, as described, and the steam or other products introduced and passed through the tubes or retorts in the chamber H. While this last operation is being carried on other producers may be employed in the production of gas which will be passed to the other part of the chamber H for the purpose of heating the tubes or retorts therein, or in the production of gas which will be passed to the same side of the chamber H for the purpose of maintaining the heat therein, so that by thus alternating the operations of the producers not only can the process be made continuous, but the temperature in the chamber H, or any part thereof, may be always maintained at a proper degree.

By the use of my process and apparatus the gaseous product during the combustion of the carbonaceous material in the producer or producers is caused to heat the pipes or retorts through which the heating or illuminating gas passes, and there will therefore be no waste of heat, while at the same time the same carbonaceous material from which the first gaseous product is evolved is employed to dissociate and decompose the steam or other aeriform fluid to make the heating or illuminating gas.

I have shown pipes S provided with stopcocks h^4, by which pipes communication is afforded between the various producers or generators.

It may sometimes be desirable to manufacture fuel gas only, and in such case carbureting may be deemed unnecessary. I desire, however, in such an event to introduce steam to the tubes or retorts, and I have shown a steam pipe R, from which extend branch pipes r, all provided with suitable cocks r'. From the branch pipes r nozzles r^3 extend through the wall of the chamber H and into certain of the tubes or retorts. By this means steam may be introduced to the tubes or retorts during the passage of the gaseous products from said tubes or retorts. In fact, steam may be introduced and employed while the gaseous product is also being carbureted, if desired.

Enriching Coal Gas by Paraffine Oil or Liquid Hydrocarbons.

[A paper read by Mr. J. Mackay, before the North British Association of Gas Managers.]

Cannel coal—as all here have more or less reason to know—has, of late years, touched a figure that has made it imperative for those of us who supply a high quality of gas to look around and discover whether it is not possible to substitute something cheaper and equally good. The present low values of paraffine and petroleum oils have attracted the attention of many to these, as being likely substitutes for first-class cannels; and those of you who have been following the technical journals relating to our industry cannot fail to have noticed the various excellent papers that have recently appeared on the subject.

In the month of December last I was in difficulties as regards cannel, and as it was not possible to obtain any in time to be of use, paraffine was thought of as a likely substitute. After a preliminary experiment, an apparatus, consisting of a force pump and a small steel tank to withstand pressure, was got up, and some oil gas obtained. An attempt was then made to utilize the oil on a working scale; and so far as enriching the gas was concerned, we had reason to be satisfied with the result. But trouble awaited us in another direction. The tar well got into a condition that left its contents of little use for any purpose whatever. The tar and liquor lay in alternate thin layers, and their separation became a difficult matter, even with the application of heat. To obviate this

trouble, the amount of oil injected was reduced, and gradually a normal condition of working was again attained. Reducing the quantity of oil did not appear to affect the gain in illuminating power; and we began to suspect that the oil had in some way been overdone. Attention was then directed to the injector orifice and the condition of the retorts, when we discovered that too much oil was being injected in a given time. If a retort gets more oil than it can gasify, the gas issues at the ascension pipe in thick volumes of a whitish color. When a small quantity only is injected the gas is thin in volume and of dark brown color.

The apparatus we now employ for the injection of the oil consists of the original slightly modified. On a square iron trough, holding about 80 gallons, and provided with a scale, the force pump is fixed; and the steel tank is placed alongside, to act as an air vessel. A malleable iron pipe is led from this air vessel to the roof, over the center of the retort bench, and continued down to the retorts by a flexible tube, terminating in a fly coupling nut and nozzle, with an orifice about $\frac{1}{32}$ of an inch in diameter. Only lower retorts are used for oil, and each door is fitted with an ordinary 1-inch cast iron stop cock furnished at the outer end with a quick-threaded screw to take the coupling nut. The outside diameter of the nozzle is sufficiently small to pass the key-way of the stop cock, which has simply to be opened, the nozzle inserted, and the coupling nut run up, previous to turning on the oil.

If a considerable quantity of oil had to be dealt with, the most economical arrangement for pumping would be an ordinary hydraulic accumulator fitted up in the usual way, and worked off any convenient shaft.

In Peterhead, 4-hour charges are worked; and with retorts in fair condition, these charges are usually completely worked off in 3½ hours. It is at the end of this period that the oil is applied. The retort door is opened and the coke levelled along the bottom. From 2 to 3 gallons of oil are injected at a pressure of 250 pounds per square inch, the time occupied in this being less than 15 minutes. Care is taken that the orifice is clear, and that the oil strikes the back of the retort. The retorts gasify this quantity without being appreciably the worse, and they are ready for a fresh charge of coal at the four hours' end.

In April last the oil was gasified (by the method just described) in various proportions to the ton of coal, in order to note what increase was made on the illuminating power of 20.5-candle gas, and also to note how far such increase was in accordance with theoretical mixtures of the two. The quantities of oil gasified varied from 6 to 40 gallons to the ton of coal, and the gas produced in each case, after being allowed time to diffuse, was tested for durability. This had to be resorted to, as I did not have a standard photometer at my disposal; and in my after calculations this want has caused me to adopt the common acceptance that the durability divided by two equals the candle power. The rise in illuminating power was satisfactory when 6, 8, 10, 12 and 16 gallons of oil were used per ton; but the candle power remained stationary from 16 to 40 gallons. On comparing the results with the theoretical candle power it was found that the illuminating power of the lower proportions were in excess of, and that of the higher proportions lower than the theoretical candle power. In the following table the results obtained are given, together with the theoretical values for comparison. The candle power of the oil gas is assumed as 50, for reasons afterwards given—

Gas Made per Ton + Gas Made from Oil.	Oil Used per Ton. 1 Gal. = 65 Cu. Ft.	Durability.	Equivalent Candle Power.	Theoretical Candle Power.
9,000 cu. ft.	0 gals.	41.20 minutes.	20.50 candles.	20.50 candles.
9,390 "	6 "	43.50 "	21.75 "	21.72 "
9,520 "	8 "	45.00 "	22.50 "	22.11 "
9,650 "	10 "	46.00 "	23.00 "	22.48 "
9,780 "	12 "	48.00 "	24.00 "	22.85 "
10,040 "	16 "	48.50 "	24.25 "	23.55 "
10,300 "	20 "	49.25 "	24.62 "	24.22 "
10,950 "	30 "	49.00 "	24.50 "	25.75 "
11,600 "	40 "	48.00 "	24.00 "	27.11 "

A sample of Russian petroleum was next obtained, to ascertain whether it possessed any advantages over Scotch paraffine for mixing in coal gas retorts. The first difficulty with it was its viscidity; but this was in a measure overcome by the application of heat and an admixture of paraffine. The effect on the illuminating power was about equal to that of paraffine, but in the tar well matters, if anything, became worse than they were before. Paraffine oil tar mixes with coal tar, but on distilling a mixture of coal and petroleum tar in the ordinary way, and casking up the refined tar, petroleum was a few days afterward found floating on the top. From this it was quite apparent that the tar from petroleum renders coal tar valueless—probably because it contains much unchanged petroleum. In any case, the low flash-point of this oil is against its general adoption. Scotch oil is comparatively safe in this respect.

With the object of discovering to what kind of treatment oil gas was amenable, I visited the oil gas works of the Caledonian Railway Company at Bridge street station, Glasgow, where gas is made on Pintsch's system, the material employed being the Scotch oil I had been experimenting with. After being treated in a manner very similar to coal gas, the oil gas is stored in a holder, and thereafter transferred to boiler-shaped tanks under a pressure of 150 lbs. per square inch. The Railway Company's books showed the make per gallon to be about 80 cubic feet—corresponding to 20,800 cubic feet per ton. The initial illuminating power was said to be 62 candles, and the candle power after compression 56. From the way the gas withstands this severe test, it is reasonable to suppose its permanency is equal to that of coal gas. This has long been a disputed point. To determine its stability a holder was filled with about 8,500 cubic feet of gas made from oil alone; the oil being injected into the retort as already described. The gas made per gallon (as shown by the station meter) was about 65 cubic feet—corresponding to 17,000 cubic feet per ton. Want of a standard photometer handicapped me here again, and consequently I did not ascertain the candle power. The gas was allowed to remain in the holder from the 4th to the 20th of May; and during this period daily observations were made to prove its stability or otherwise. The lowest temperature recorded by the water in the tank was 44° F., and the highest 50° F.—the average for the whole time being 46° F. The lowest temperature recorded by the thermometer in the sun was 45° F., and the highest 55° F.—the average being 50° F. The atmosphere most of the time was thick and foggy. The durability and the hydrocarbons absorbed by bromine were tested daily; and it was here that the most unexpected results were obtained. Neither of these fell away in the least during the whole period. On 5th May 70.9 minutes was the durability recorded, and hydrocarbons absorbed by bromine 20 per cent. On 20th May the results obtained were 71.2 minutes, and 20 per cent. of hydrocarbons. During the above time the durability did not vary more than about a minute, and the hydrocarbons remained absolutely constant. From the durability obtained it would appear the illuminating power was comparatively low; but I am of opinion that our jet photometer (adjusted as it was for 25-candle gas) was unable to cope with the oil gas. The only burner I could get to consume the gas satisfactorily was a Bray No. 0; and this gave a light superior to a No. 4 with 25-candle gas.

To test the stability of the gas under cold, 300 cubic feet were passed at the rate of about 1½ cubic feet per hour through 20 feet of block-tin pipe immersed in a mixture of ice and salt, and the liquid hydrocarbons collected. In all, 7 cubic centimeters were condensed—corresponding to a condensation of 0.3 cubic foot per 1,000. After this, 300 cubic feet of gas from the coal used for mixing were next subjected to the same test, and exactly the same amount of condensation took place. These results, if they are worth anything, show that oil, gasified in ordinary coal gas retorts, yields a gas that is equally as permanent as coal gas.

The purification of oil gas need hardly be entered upon, as the oil contains only 0.06 to 0.07 per cent. of sulphur.

The volume of tar produced in the manufacture of oil gas varies from 15 to 25 per cent. of the oil used. It is neutral in reaction, and has a specific gravity of about 1.1. It is said to be free from phenols and basic constituents, and to contain but little benzenoid hydrocarbon. There seems to be considerable doubt as to the value of the tar; and in order to throw some light on the subject a quantity of tar was obtained and examined. The tar was formed during the gasification of shale oil in a Pintsch's retort; and it has to be borne in mind that it may differ considerably from that formed during the gasification of oil in ordinary fireclay retorts. The specific gravity of the tar was found to be 1.09. On distillation a total yield of 9.9 per cent. was obtained up to 100° C., the amount operated on being 2 gallons. The naphtha was treated in the usual way with soda and sulphuric acid, and then submitted to fractional distillation. It yielded 37.7 per cent. of 90 per cent. benzol, of a specific gravity of 0.879. The benzol was nitrified, when 100 parts produced 151.8 parts of nitrobenzol, having a specific gravity of 1.201. The oil tar, therefore, contained 2.87 per cent. of 90 per cent. benzol—a larger proportion than that usually obtained from ordinary coal tar.

A sample of tar from our own well was now examined. For some time previous, oil has been used in conjunction with coal to the extent of 9 gallons to the ton. An examination of this tar for naphtha and benzol would, therefore, give a general indication of its value when oil was in regular use. The specific gravity of the sample was 1.105. It gave a total distillate of 13.9 per cent. up to 100° C. (naphtha, 5.1; water, 8.8). The specific gravity of the naphtha was 0.927, and yielded 20.2

per cent. of 90 per cent. benzol of specific gravity of 0.856. On nitrification, 100 parts gave 141 parts of nitrobenzol, specific gravity 1.189. The tar, therefore, yielded 1.03 per cent. of 90 per cent. benzol of very low gravity.

The following are the results in tabulated form:

Tar Tested for Crude Naphtha.

Description of Tar.	Specific Gravity of Tar.	Total Distillate up to 100° C.	Percentage of Crude Naphtha.	Specific Gravity of Naphtha.	Percentage of Water.
Oil tar	1.09	9.9	7.6	0.881	2.3
Mixed tar from 8 gallons of oil to 1 ton of coal	1.18	13.9	5.1	0.927	8.8

Examination of Crude Naphtha.

	Loss on Washing.	Percentage of 90 per cent. Benzol.	Specific Gravity of Benzol.	Percentage of Nitro-benzol.	Specific Gravity of Nitro-benzol.
Oil tar naphtha sp. gr., 0.881	7.0	37.7	0.879	151.8	1.201
Mixed tar naphtha sp. gr., 0.927	13.3	20.2	0.856	141.0	1.189

It should be mentioned that previous to nitrification, the benzol was fractionated, with the following result:

	84° C.	85° C.	100° C.	120° C.
Benzol from oil tar	—	First drop 3 per ct.	72 per ct.	95 per ct.
Benzol from mixed tar	First drop.	14 per cent.	70 per ct.	94 per ct.

To compare the cost of enriching by oil as against a first-class cannel is rather a difficult matter, seeing one of the prime factors—the illuminating power—is awanting in the case of the former. We have seen that the Caledonian Railway Company accept it as 56 candles after compression. Other authorities place it at 50 candles and over. In the present instance, I think, the latter figure may be safely assumed. The yield from the oil we already know to be 17,000 cubic feet per ton. Calculating this into sperm value, we have:

$$\frac{17,000}{5} = \frac{3,400 \times 50 \times 120}{7,000} = 2,914 \text{ lbs.}$$

of sperm per ton of oil, costing, delivered in Peterhead, exactly £4. Against this, I have placed a cannel, offered us this summer, showing (on the published analysis) 12,700 cubic feet of 32-candle gas per ton. Calculating as above, we have $\frac{12,700}{5} = \frac{2,540 \times 32 \times 120}{7,000} = 1,393$ lbs. of sperm per ton of coal, costing, delivered in Peterhead, £2 per ton. This, as it stands, shows only a small saving in favor of oil; but it has to be considered that 2 tons of cannel cannot be replaced by 1 ton of oil, for the reason that no apparent economy is to be derived by using more than 12 or 15 gallons to the ton. From the table showing the effect of adding given quantities of oil to the coal, it will be observed that 12 gallons of oil raised the candle power from 20.5 to 24 candles. The coal used for testing yielded, on an average, 9,000 cubic feet of 20.5-candle gas, and cost, delivered in Peterhead, 16s. 9d. per ton; and 12 gallons of oil yielded 780 cubic feet of 50-candle gas, costing 4s. This worked out gives:

9,000 cubic feet cost 16s. 9d. + 780 cubic feet cost 4s. = 9,780 cubic feet cost 20s. 9d.

$$= \frac{1,000 \times 20\text{s. } 9\text{d.}}{9,780} = 2\text{s. } 1\tfrac{1}{4}\text{d. per 1,000 cubic feet.}$$

To raise 9,000 cubic feet of 20.5-candle gas to 24 candles, 5,250 cubic feet would be required from the cannel referred to above. In calculating this result, 10 per cent. was taken off the cannel analysis for working. Calculating as before we have—

9,000 cubic feet cost 16s. 9d. × 5,250 cost 18s. 7d. = 14,250 cubic feet cost 35s. 4d.

$$= \frac{1,000 \times 35\text{s. d.}}{14,250} = 2\text{s. } 5\tfrac{1}{4}\text{d. per 1,000 cubic feet.}$$

Showing a saving in favor of oil of 4¼d. per 1,000 cubic feet of 24-candle gas.

These figures refer to Peterhead, which is a considerable distance away from the coal fields, and it, therefore, does not follow that they would be applicable in all cases. Against the saving brought out, it may be maintained that there is a loss on residual products. There is no ammonia, but this is set off by the freedom of the oil from other impurities. Of tar we have seen there is a fair quantity, but its value has yet to be ascertained. From coke a gain may be expected, as cannels are replaced to a considerable extent by splints yielding a larger quantity of better coke. Last year, notwithstanding a free use of oil, we sold considerably more coke per ton of coal carbonized than we did the previous year; and this summer, through ceasing the use of cannel entirely, our production of coke for sale has increased to a very considerable extent.

In conclusion, I desire to thank Mr. J. F. Tocher, A.I.C., F.C.S., of Peterhead, for the assistance he has rendered me, more especially in determining the nature of the tar.

The Vulcan or W. H. Taylor Gas Process.

We are indebted to Mr. John Gimper, Superintendent of the Galveston (Texas) Gas Company, for the following newspaper account of the W. H. Taylor process of gas making, which the inventor proposes to exploit through the agency of the Vulcan Gas Company, of Chicago. As Mr. Gimper suggests, it will be noticed the article contains but little mention of the working of the process, although much is said about its inherent advantages, etc. Mr. Taylor is quoted as having said:

Gas by our process is generated by a decomposition of crude petroleum together with superheated steam in iron retorts, using not to exceed 3½ gallons of crude petroleum to make 1,000 cubic feet of 26 candle power gas, which gas is utilized for all purposes of fuel by simply admixing with the rich illuminating gas 9 volumes of atmospheric air. This gas mixed with air will not stratify, and is served for the two purposes of light and fuel from the same holders and mains, the air for fuel being mixed after the gas leaves the meters. Our furnace is 6 feet long by 6 feet broad and 5 feet high; and provided with our new patent, the box burner, so as to heat the retorts and furnace with the gas generated by the same. Solid fuel is not required.

Our plant is inexpensive where compared with any other process capable of producing an equal amount of gas in any given time.

This small furnace, with three retorts in a bench, is capable of producing 75,000 cubic feet of 26 candle power illuminating gas in 24 hours. One man will easily do all the work in connection with ten such furnaces; the process is nearly automatic; it is perfectly safe; occupies little room; the burner is perfect, consuming all the gas; and gives off no vapor or smoke, and distributes the heat in a furnace or under a boiler so as to utilize all the heat. The result of several protracted tests for the evaporation of water shows 45 pounds of water evaporated under 60 pounds pressure by every pound of oil made into gas. As fuel for boilers and furnaces and domestic uses it is superior to solid fuel in every way, costs less in money, less in labor to handle, makes a fire quicker, is extinguished by turning a valve, stopping the expense of fuel when your work is done, no ashes, no cinders, no smoke. This gas has no poisonous elements; its analysis is, as reported by chemists and experts in gas:

	Per Cent.
Hydrogen	10.00
Carbonic oxide	.50
Carbonic acid	.90
Illuminants	26.40
Marsh gas	14.20
Oxygen	9.00
Nitrogen	39.00
Ammonia	none
Sulphur	none
Candle power	26.10

This gas needs no purification, no washing, no scrubbing, and makes a beautiful white and perfect light; it has enough odor to be detected if escaping in a room, but it is free from the deadly ingredients of sulphur and ammonia and carbonic oxide nearly.

This gas is used through the same burners, pipes, fixtures and motors as ordinary gas; leaves no deposit of any kind in the burners. The commercial value of the invention has been fully demonstrated for metallurgic, manufacturing and domestic purposes, for all of which this system far surpasses all others.

From less than 4 gallons of crude petroleum 1,000 feet of 26 candle power illuminating gas is made, which gas, as analyzed by well known gas experts, gives substantially the foregoing results.

This fixed gas does not condense even when submitted to a freezing temperature, and it is obvious from the material from which it is made that the highly objectionable qualities, such as sulphur, ammonia, sulphurated hydrogen, etc., found in ordinary illuminating gases, are peculiarly absent in this gas.

This gas is used as a fuel for all purposes of producing heat by an admixing of nine volumes of atmospheric air with one of said gas, which will produce a heat flame equal to the best natural gas known. From the foregoing statement it will be seen that this 26 candle power illuminating gas can be produced at the holder at a cost not to exceed 25 cents

per 1,000 feet, depending on the price of petroleum, thus (by the admixture of atmospheric air) bringing the price of fuel down to a nominal figure.

As the volume of gas fuel, generated by this process from less than 25 gallons (163 pounds) of crude petroleum is more efficient than 1 ton of anthracite coal, there is in its use a large saving in transportation alone. Our process can also be economically and profitably utilized for single houses or groups of houses.

The absolutely perfect decomposition of all material used and the simplicity of our system renders it more profitable for use under boilers and in furnaces and for all purposes when heat is required for manufacturing, such as for reheating iron, for glass works, potteries, brick and lime kilns, iron and steel works, as well as for domestic purposes—heating and cooking.

Its economy for these purposes will be apparent when you consider the scarcity and high price of solid fuel. Prof. P. H. Van der Weyde, of Brooklyn, N.Y., investigated our processes for several weeks during the severe cold of January and February. The conclusions he arrived at are briefly given as follows:

"I made an examination of it and found it a perfectly fixed gas. I tested it under cold 25° below freezing and found no condensation. I found the estimate correct. Three gallons of oil, crude petroleum, will give 1,000 feet of this gas, free from sulphur and of most excellent quality. It can be made on a large scale, and will travel through pipes under pressure. It is not any more dangerous than coal gas, and it has not the hurtful elements which coal and some other gases contain. I have proved that air added to this gas, when too rich, will cause the carbon to be perfectly consumed, and increases the illuminating power to the point where smoke ceases and perfect combustion takes place. Beyond that point the addition of air reduced luminosity and increased heat."

Briefly we claim: (1) cheapness of manufacture; (2) superior quality; (3) cheapness and durability of plant; (4) no residuum or waste in manufacture; (5) a 26-candle power gas for 25 cents a 1,000 feet; (6) a fuel gas at 5 cents a 1,000 feet, equal to natural gas; (7) 25 gallons of crude petroleum equals a ton of anthracite coal; (8) entire freedom from poisonous properties; (9) as a fuel it is unequaled for iron and steel works, glass works, potteries, brick and lime kilns, boilers, furnaces, etc.; (10) it is the only practical fuel for reducing low-grade and refractory ores; (11) for light and heat and power it is perfection.

It will be noticed that we are able to serve our gas to customers as an illuminating and fuel gas, using one set of main pipes and holders, as our illuminating gas is diluted at the point of combustion for heating purposes by the admixture of 9 volumes of atmospheric air with 1 volume of our rich, 26-candle power illuminating gas. The air is mixed by our device in connection with our burner, of which we are the sole owners. Our fuel gas burner for furnaces and under boilers is novel in its construction, giving a gas flame covering the whole extent of the floor of the furnace.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, Augus 10, 1892.

The Murdoch Memorial.—Mr. J. Mackay on Enriching Coal Gas.—Some Big Electrical Machinery.—The London Gas Companies.

The chief event of the last month, in connection with gas interests, was the unveiling of a bust of William Murdoch, the inventor of gas lighting, in the Wallace Monument at Stirling, N. B. This was a feature in connection with the usual annual meeting of the North British Association of Gas Managers, which was held in that town, on the 28th and 29th ult. On previous occasions I have referred to the fact that this Association had determined to do something in the way of perpetuating the memory of their illustrious countryman, and they succeeded in raising a sum of £333 by subscriptions. They then felt in a position to place the commission for the bust in the hands of Mr. D. W. Stevenson, R. S. A., of Edinburgh, who has produced a work in white marble that is generally admitted to be thoroughly satisfactory in every way, and a beautiful specimen of art. After paying all expenses in connection with this, a sum of £200 or so will remain in hand, and this is to be devoted to the founding of a scholarship in one of the colleges. There was only one other bust of Murdoch extant, previously to the unveiling of this one, and that is a "Chantrey," and is located in the church at Handsworth, near Birmingham, where Murdoch has been accorded a modest place beside the monuments of his employers, Messrs. Boulton and Watt, whose interests he served loyally, even to the detriment of his own.

On the second day of the meeting, the President and officers, including Mr. M'Gilchrist, the Secretary and Treasurer of the Memorial Fund, a large contingent of members, the burgh officers of Stirling and a select company of visitors, including Lord Kelvin, Sir William Arrol (one of the contractors for the Forth Bridge), two grandsons, and another relative of William Murdoch, proceeded in state to the monument, headed by a "Highland piper," according to the fashion in Scotland. It should be explained that the Wallace Monument is a lofty tower, erected on the summit of a hill, and, therefore, a prominent object in the neighborhood. It was built about 20 years since, by public subscription, in memory of the champion of Scotland, Sir William Wallace. It contains three apartments, one above the other, the center one of which is called "the hall of heroes," and already contains busts of Robert Bruce, Sir Walter Scott, Robert Burns, Thomas Carlyle, James Watt and other famous Scotsmen, and the object of the present ceremony was to inaugurate the placing of the bust of William Murdoch amongst those of his celebrated countrymen in this temple of fame. No one who has read an account of the extremely interesting and eventful life of our hero will deny that this honor was well deserved. After some introductory remarks by Provost Kenross, one of the custodians of the tower, the President of the Association (Mr. McPherson, of Kircaldy) gave an account of the efforts made by the Memorial Committee, which had culminated in the meeting that day, and called upon Lord Kelvin to unveil the bust. This was done amid great enthusiasm, and Lord Kelvin delivered a speech appropriate to the occasion. Subsequently the party assembled at Sterling for luncheon, and in the course of the post-prandial proceedings the services of Mr. M'Gilchrist in connection with the fund, which had extended over ten years, were recognized, and he was invited to sit for his portrait in oil as a mark of esteem on the part of his fellow members.

The space at my command precludes anything like an attempt to review the whole of the proceedings at this meeting; but I should like to direct attention to Mr. Mackay's paper on the subject of enriching coal gas by paraffine oil or liquid hydrocarbons. The increasing cost of high class cannels, on the one hand, and the cheapness of various liquid hydrocarbons on the other, renders this matter specially deserving of attention at the present time, particularly in localities where, as is the case in Scotland, gas of 20 candle power or over is in demand. A great deal has been heard lately about carbureting gas, but however suitable this plan may be in large towns, where there is a quick draught on all the mains, its adaptibility to small country districts has yet to be demonstrated. Mr. Mackay has been working in the direction of manufacturing oil gas in the ordinary coal gas retorts. He runs four hour charges, and having observed that the coal is usually exhausted in 3½ hours, has endeavored to turn the odd half hour to account. To do this he removes the lid of the retort and levels the spent charge if necessary, replaces it, and connects up a flexible coupling to a cock screwed into the lid. By this means the retort is brought into connection with a force pump, from which two to three gallons of hydrocarbon are injected into the retort at a pressure of 250 lbs. per square inch, in the course of 15 minutes or so. This is converted into gas. The coupling can be taken off, leaving the retort at liberty for drawing and charging in the usual way at the proper time. Mr. Mackay's plan, therefore, presents the advantage of utilizing the existing appliances. There is only a small store tank, force pump, connections, etc., to be provided, and these can be fixed in any out-of-the-way corner. They could almost be rigged up in a few hours on the occasion of any emergency affecting the quality of the gas. At any rate the plan is so simple, so cheap and so effective as to offer a very convenient means of keeping the quality of the gas at the right pitch, notwithstanding bad coals, scarcity of lime or other contingencies. Mr. Mackay's experiments are of a rough and ready character, as in a small country works there are not the laboratory appliances that are now invariably provided in a large undertaking; but, notwithstanding these disadvantages, he proved that the gas produced by this hybrid process was at least as permanent as ordinary coal gas, and that the use of paraffine oil at £4 per ton was more economical than cannel coal at half the price, to the extent of about 4d. per 1,000 cubic feet. One or two other gas engineers have taken up the line adopted by Mr. Mackay within the last year or two, but they have not, to my knowledge, gone into the question so extensively, or on anything like a permanent basis.

I recently enjoyed the privilege of a visit to the generating station of the London Electric Supply Association, which is situated at Deptford, about 6 miles from the center of supply. From these works the current is conveyed by means of four conducting lines to four distributing sta-

tions, conveniently situated for the supply of the electricity to the customers. Each conducting line consists of two concentric copper tubes, respectively about ¾ inches and 1¾ inches in diameter, kept apart by layers of strongly compressed brown paper soaked in ozokerit, as an insulating material, and inclosed in a steel tube. There are in all about 28 miles of main conductor, through which a current of 10,000 volts travels. This is transformed down to 2,400 volts at the distributing stations, and again to 100 volts at each house. The object of conveying it at such a high intensity is to economize conducting material. There are two 600 and two 1,500-horse power Corliss engines at Deptford, each one driving a Ferranti dynamo. The engines run at 90 revolutions, and drive the dynamo's at 250 revolutions per minute, through the medium of direct cotton rope belting. I am told that the capital already expended by this corporation alone (there are eight or nine other electric companies in London) amounts to £750,000, and that the cost of laying electrical conductors in a London street, including replacing pavement and all complete, averages 25s. per yard.

The half-yearly reports of the London Gas Companies for the first half of 1892 have just been issued, and indicate on the whole a fairly satisfactory state of affairs. There is a trifling decrease in the consumption of gas, but not more, indeed, not so much, as would be accounted for by the milder weather that prevailed during the period in question, especially when it is remembered that the early months of 1891 were unusually severe, and that an abnormally large increase in the consumption of gas was the result. With the increased use of gas heating stoves, the factor of temperature acquires almost as much importance as that of hours of darkness as affecting the demand for gas. As unusually cold weather has been found to create an increased consumption of gas, so the converse must be expected to follow, viz., a decrease, if the weather is more than usually warm. Averaging the two years together, there is an increase of 3 per cent. per annum, which is about the usual rate of increase that has now prevailed for some years past.

I dwell particularly on this point, because some endeavors have been made to show that the consumption of gas is suffering from the inroads of electricity. But the facts do not support such a view. The introduction of electricity is creating a demand for a larger amount of artificial light, and it is found that even in the streets where the electric lights are thickest the consumption of gas is not less than before their appearance. The Gas Light and Coke Company show a balance of profit for the half year of nearly £540,000—about £160,000 more than that for the corresponding half of 1891. This sum has been entirely saved on the items of coals, which shows a reduction of about 16 per cent., and there is also a large reduction—some £25,000—on the item of wages. The South Metropolitan Gas Company have not been quite so fortunate. Their earnings fall a trifle short of the sum required to pay the maximum dividends. But, then, their price for gas is 7d. less—2s. 6d. against 3s. 1d. per 1,000 cubic feet (60 cents against 74 cents). Both undertakings have suffered from the low state of the residual market, which is now in the remarkable position of showing coke, tar and ammonia all at a low ebb. On former occasions it has usually happened that if one product is cheap another is dear, and so there has been some compensation. But this feature, which would be a very welcome one, is now wanting. The Gas Light and Coke Company appear to have lost almost the whole of their large saving on the price of coals, by the reduced returns from residuals. Under such circumstances increased prices for gas are inevitable. During the past half year both Companies have had to contend with difficulties caused by a strike, lasting about 3 months, in the Durham coal fields from which they derive their supplies of coal. But it is satisfactory to notice that they had no difficulty in meeting the deficiencies by purchasing in other districts, and that the extra expense was comparatively trifling. The fact that Scotland and Germany contributed to fill the gap should not be lost sight of by the coal miners, who are rather inclined to think that they can rule the roast in the matter of the price of coal.

Safe Wiring.

Mr. A. B. Smith, at a meeting of an electrical association, held some weeks ago at Hamilton, Ont., said: In presenting the few remarks I shall make under the head of safe wiring, is is not my intention to enter into a lengthy description of what may be termed mechanically safe construction. It would be impossible to do this, as the conditions to be met in general work are so diverse. In fact, it may be said that no two installations in existence are exactly alike. On a few points there are some rules that apply invariably, but I intend rather to look at it generally from a "moral" standpoint. For instance, it is well known that dampness is a moral enemy to successful results. To guard against this, it is necessary that every man engaged in an installation, from the highest and best paid men to the mere laborer, should conscientiously do his part. I need scarcely point out to you that the interests of the electric lighting fraternity and that of the insurance companies are identical. A failure to get good results, or a risk of serious loss, is a detriment to one as well as the other. I lay great stress on the importance of conscientious work by individuals rather than on the laying down of rigid rules. It is impossible to make a hard and fast rule to cover every minute detail of an installation, and, therefore, without this dependence on the honesty of the workmen very little in the way of safeguards can be actually accomplished. Safe wiring is more a matter of men and material than of method.

I know of no business on the face of the earth where the public and the insurance companies have to depend more on the individual reliability of the workmen than on this one. On account of the immediate concealment of work almost before it is completed, opportunities to do negligent work are abundantly offered, so that it requires more than ordinary conscientiousness in men engaged in the work and circumspection in its oversight.

While, in a few instances, much trouble and annoyance are caused by unskilled electric men, who have an idea they possess more knowledge than can be carried by one single brain, still there is a source of trouble to electric light people and the underwriters which is most serious. What I refer to is the ignorant and clumsy interference with good wiring by plumbers, steam and gas fitters, and other pipe men, and our friend, the ubiquitous bell-hanger. These individuals, with supreme contempt of others' rights, or through ignorance, not realizing the danger of their practices, are constantly making mischief. Nine cases out of ten, where trouble is located in an otherwise perfect piece of work, these pirates are to blame. It is a common occurrence to find gas or water pipes resting upon electric wires; these pipes or other iron work having been placed in position after the electrical work has been completed. Furthermore, there is a certain class of men, especially gas fitters, who really have an idea that they do know something about electricity, and who believe that because wires are sometimes run in pipes that it is their special vocation to do it. It is true in this, as in other matters, that "a little knowledge is a dangerous thing." Unfortunately the public have no protection against these half-baked electricians, and it is against this class of work that the insurance companies have to fight their greatest battles. Serious loss has only been averted by constant and skillful supervision, and were it not so the loss from this source would be vastly greater.

There are only one or two points in reference to construction work of general application which I would like to refer to. One of these is the use of cleat work in cellars and other places liable to dampness, unless a sufficiently protected wire with a superior insulation to ordinary waterproof is used; in fact, I would much prefer to prohibit absolutely the use of cleats altogether in places liable to the slightest dampness.

Also a word of warning will not be out of place against the indiscriminate use of porcelain knobs for outdoor purposes. These knobs are good and useful in their proper place, but the average lineman seems to imagine that porcelain is a panacea for all the evils that afflict a wire.

In closing, I desire to sincerely congratulate the members of the Association on the cordial relations now existing between the underwriters and the electrical fraternity. The future maintenance of this happy condition remains in your keeping. By employing none but thoroughly reliable men and using good materials, the present insignificant percentage of loss by fires of electric origin will be rendered still less.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

At a recent meeting of the Directors of the Tampa (Fla.) Water Works Company, Mr. R. L. Henry, President of and a Director in that corporation, tendered his resignation of both offices. Mr. J. S. Schofield was chosen to fill the vacancy in the Board, and the latter thereupon elected Mr. Arthur E. Boardman to the Presidency. Mr. Boardman was also requested to act as Secretary and Treasurer.

The voters of Sonoma, Cal., have agreed to the proposition of Trustees Schoken and Litzius, who urged the establishment of a small gas works, to be operated on municipal account, chiefly for the purpose of street lighting. It is thought, however, now that the taxpayers have signified their willingness to support the scheme, that a plant sufficiently large to meet the general lighting needs (both public and private) of the place will be installed. This place, which is a post town of Sonoma

county, is located on Sonoma creek, at a point about 45 miles north of San Francisco, and has grown rapidly within the past decade. It is noted for its production of grapes and other small fruits.

THE Alton (Ills.) Gas and Electric Light Company has taken possession of its new offices, and Supt. Tracy says that he feels as if he were somebody in town just now. In the meantime he would like to receive a few photographs of important pieces of apparatus—such as holders, purifying apparatus, etc.—that have been erected by contractors at different points in the country. Such photographs will be promptly "hung" on the office walls.

PAW PAW, Mich., not long ago wished to have an electric lighting system "in its midst," and in due time that wish was met. The reality of the service, however, was so far from the estimate of what such should be in the opinion of the residents, that the Village Board early this month declared "the electric company had violated its contract, and that it be ordered to remove its poles and wires forthwith."

THE following announcement of the changes in the executive management of the National Gas Light and Fuel Company (mention of which was given in the JOURNAL for last week) was made in Chicago under date of the 15th inst.:

"Announcement is herewith made that after this date Mr. Alten S. Miller will have charge of the affairs of the National Gas Light and Fuel Company, in place of Mr. Fredk. H. Shelton, who will hereafter act for this Company in the East.

"All inquiries in Western territory relating to water gas in general, the Springer and Lowe apparatus in particular, or other business of the Company, will please be addressed to Mr. Alten S. Miller, as Manager, 52 Lake street, Chicago."

THE following is from the Portland (Oregon) *Dispatch*: "In the retirement of Messrs. H. C. Leonard and John Green from the Portland gas works, two of its earliest business men drop out of active commercial life. These two gentlemen were among the first who felt confidence in the future greatness of Portland, and while the city was in its infancy secured the water and gas privileges, the former of which they sold to the city a few years ago, while they have now disposed of the latter to a local and foreign syndicate of capitalists. They have accumulated a neat competency and retire to enjoy the fruits of a life's labor of industry. They retire with the best wishes of the people of Portland, having served them well and honestly in their dealings with the public. The *Dispatch* hopes that both Mr. Green and Mr. Leonard may live to enjoy the fruits of their labor for many years. They are both men who have hosts of friends."

AT a meeting of the Lexington (Ky.) General Council, held about a fortnight ago, one of the matters that attracted much attention and comment was the petition of Messrs. John W. Frazee, J. Wood Browning, M. C. Alford, Matthew Walton and Frank S. Owens for an ordinance to construct and operate an illuminating and fuel gas works in opposition to the present Lexington Gas Company. The main points in the proposed ordinance are as follows: The Company is given unlimited right to use the streets for the purpose of laying gas mains, is to charge not in excess of 50 cents per 1,000 cubic feet to the city or to private consumers, is to begin the work of construction within one year after the date of the passage of the ordinance, and is to begin the supply of gas within two years thereafter. The public lighting contract with the old Lexington Gas Light Company expires in 1895. The fuel gas proposition looks very much like a "strike," for it is patent that the supply of a good article of illuminating gas cannot be carried on at Lexington, for any length of time at least, at the rate proposed in the ordinance. The ordinance was referred to a special committee, comprising Messrs. Tracy, Hocker, McCormick, Young and Houlihan.

ASSOCIATED PRESS despatches to this city, dated Aug. 19, are to the effect that it has been decided to illuminate the streets of St. Louis, Mo., on both Oct. 12 and 21, as well as on 10 other nights, making 12 illuminations of 2½ hours each. As there are 75,000 gas lights used in the illumination, this will involve the expenditure of nearly $100,000, and will result in the most costly illumination ever attempted. The money for the display is deposited in a city bank, having been subscribed by the merchants of the city.

THE proprietors of the Madison (Ind.) Gas and Electric Light Company have contracted with the Brush Company for an arc light plant, and with the Fort Wayne Jenney Company for an incandescent electric light plant.

THE Committee on Corporate Institutions, of the Kentucky Legislature, lower branch, has reported a measure that proposes to limit the maximum charge that may be made for gas in that State to $1.50 per 1,000 cubic feet.

WE are in receipt of a circular recently issued at the instance of the "Non-Explosive Sanitary Gas System, Melvin D. Compton sole agent for the United States," which is devoted to a report on the merits of the system, by Mr. O. H. Michaelson, Supt. of the Charleston (West Va.) Gas and Electric Company, and to a reprint from the Charleston *Daily Star-Tribune*, which mainly goes over that which is said to have been accomplished by Mr. Michaelson at the Charleston gas works with the "Sanitary," etc., in a practical way. Mr. Michaelson seems to be an enthusiastic advocate of the process, and reports that the product is a perfect success, save in respect of its adaptability for gas engine purposes, he referring to this part of the scheme in the following manner: "We did not take much stock in your claims for non-explosiveness, but when the gas was turned into the mains, and every gas engine in the city stopped, we were forced to admit that sanitary gas was non-explosive." We would, of course, be better posted in respect of the extent of this disaster did we know how many gas engines were in use in Charleston; but Mr. Michaelson fails to state the number. He, however, does say that, with a "fraction less than 12 cents worth of oil and coal to the 1,000 cubic feet, the gas averages 20 candle power." The plant occupies "less than one-fourth of the space of the coal gas generators, scrubbers and purifiers, and the capacity of the sanitary gas plant is greater than the other, yet it is operated by half the help required by the other." In fact, so well does the sanitary system please the Charleston folks that they are now *considering* the advisability of abandoning their coal gas plant and going into the sanitary system exclusively. Why consider, Mr. Michaelson? You have proved the virtues of the new to be far in excess of and without any of the vices of the old system; and so certify over your own signature. The time, then, for consideration is past, the hour for the rejuvenation is now—at once. We await further advices from Charleston, and these we predict, will show a change of heart on the part of the owners, and perhaps on the part of Mr. Michaelson.

IF Mr. Michaelson is satisfied that the sanitary system is greatly superior to the former practice of gas making followed on the Charleston works, both in regard to cheapness and illuminating value, his belief in these things is as nothing compared with his certainty that the sanitary article is in every prime essential really and truly sanitary. He has put it to the supreme test, in evidence whereof we submit the following further excerpt from the circular: "Nothing daunted by the unbelievers the Superintendent proceeded at once to show what sanitary gas was by connecting a rubber tube to a small pipe and inserting the other end in his mouth, inhaling the gas freely for several moments. He then filled his mouth and lungs with the gas, and placing a small tube in his mouth, lighted the gas and it burned freely, to the astonishment of all present, thus proving the perfect harmlessness of the sanitary gas." All of which goes to show that Mr. Michaelson must have a wonderful set of lungs, if nothing more; and a little reflection points to the fact that he might easily secure a lucrative position with the greatest show on earth, since he could, to a certainty, outdo any fire-eater that ever lived. We look forward to the next circular from the sanitary gas folks' literary bureau for the dissemination of new facts in connection with advances in the art of gas manufacture with curiosity not unmixed with awe.

THE works at Jacksonville, Fla., are being thoroughly overhauled, under the supervision of Mr. L. S. Merrifield, of the U. G. I. Company.

THE Philadelphia *Press* says that City Solicitor Charles F. Warwick and Assistant City Solicitor E. Spencer Miller have instituted ten suits in the Philadelphia Common Pleas Court, No. 1, on behalf of the city, to recover from as many telephone, telegraph and electric lighting companies, license moneys alleged to be due for the use of poles and maintenance of wires within the city limits. The actions are brought under the ordinances of Councils approved January 6, 1881, and March 3, 1883, for regulating the erection and maintenance of telegraph poles and underground conduits. It appears from the statement of the claim that the charges are 50 cents per mile for wires attached to city poles, $1 for poles maintained by the city, and $2.50 per mile for telegraph and telephone wires, and $5 per mile for electric lighting wires maintained by the city on poles and over buildings. The city makes claims as fol-

lows: United States Electric Lighting Company, of Pennsylvania, $786; Philadelphia Electric Lighting Company, $417; Bell Telephone Company, $3,355; Atlantic and Pacific Telegraph Company, $333.50; Brush Electric Light Company, $1,143; American Rapid Telegraph Company, $139; Philadelphia, Reading and Pottsville Telegraph Company, $509; Mutual Union Telegraph Company, $1,479; Western Union Telegraph Company, $2,840; American District Telegraph Company, $215.

THE following is the text of the ordinance granted by the Select Council, of Westboro, Mass., in the matter of gas works for that borough: "Permission is hereby given to Henry S. Jackson Henry R. Thompson and their associates or successors, to build and operate gas works in the town of Westboro, Mass., for the period of 50 years, and they are hereby invested with the right of using the streets, alleys and public places of said town, as now or hereafter to be laid out, for the purpose of laying mains and pipes to provide said town and its inhabitants with gas for illuminating, heating and power purposes; the said gas mains and pipes shall not be so laid as to interfere with or obstruct the drainage, construction of sewers, or underground fixtures for the conveyance of water in said town, or the necessary or proper use of said streets, alleys or public places; said streets, alleys or public places to be left in condition subject to the approval of the Selectmen. The rights hereby granted shall take effect and be in force from and after the passage of this order, provided the above mentioned plans shall be completed inside of six months." The ordinance was passed on the 4th inst.

THE Berlin Iron Bridge Company, of East Berlin, Conn., will design and erect the new buildings for the New Orleans and Carrollton Railroad Company, at New Orleans, La. The power house is 83 feet wide by 130 feet long, and is to have brick walls and an iron roof. The car shed, which is to be built entirely of iron, will be 130 feet wide by 140 feet in length. It is the purpose of the Railroad Company to have the finest electric railroad plant in the Southern States.

AT the Annual meeting of the Natick (Mass.) Gas Comyany the following officers were elected: Directors, Francis Bigelow, H. W. True, H. Harwood, E. I. Garfield and E. B. Taber; President, Francis Bigelow; Treasurer, H. W. True.

AT a recent meeting of the Board of Aldermen of St. Paul, Minn., the resolution passed by the Assembly providing for the appointment of a committee, with authority to spend $5,000 for the "extra illumination of the streets during what is known as "Fair Week," was considered. After some debate, on motion of Ald. Conley, it was determined to indefinitely postpone the matter, which means that the beautiful illumination of certain parts of the city, and which in past seasons has added so much to St. Paul's attractiveness on the occasion of the annual State Fair, will not be carried out this year.

IT is again rumored that a controlling interest in the Dover (Del.) Gas Light Company has been secured. This time it is said that the purchasers are Messrs. W. T. Johnson & Brother, and it is also asserted that an electric lighting plant will be operated in connection with the gas supply.

THE Directors of the Lexington (Mass.) Gas Company have voted to engage in the business of manufacturing and distributing electricity for lighting purposes.

SOME idea of the growth of the gas business in Worcester, Mass., may be obtained from the changes that are being made in the mains of the Company. Several miles of pipe have been replaced with tubes of much larger diameter than that of those taken up. For instance, on Main street a long section of 4-inch pipe has given way to a main 12 inches in diameter; and so it goes all through the list.

THE Board of Public Works, Roanoke, Va., advertise for proposals for lighting the streets by means of arc lamps, the competition to close on Sept. 5. There are now in use there about 300 gas and oil lamps.

A FEATURE of the session of Section D., Mechanical Science and Engineering, at the Rochester meeting of the American Association for the Advancement of Science, was a paper entitled "Results of Municipal Ownership of Gas Works in the United States During 1891," read by Prof. Edward W. Bemis. It gave no details of moment aside from those contained in the Professor's earlier paper on this topic, copious extracts from which were given in the JOURNAL, issues of Jan. 25 and Feb. 1, 1892.

AN assessment of $30 per share was, on July 11, levied on the capital stock of the Central Natural Gas Company, of Stockton, Cal. The delinquent date was set for Aug. 15, and the date for sale of stock on which the assessment remains unpaid is fixed for Sept. 20.

THE offices of the Lawrence (Mass.) Gas Company will, on and after Sept. 2, be in the premises on Essex street now occupied by Messrs. Rennelly & Sylvester.

THE Hazelton or porcupine type of steam boiler, the manufacturer and sole proprietor of which is the Hazelton Boiler Company, at No. 716 East 13th street, this city, finds continued favor with gas companies. Many orders for the apparatus are now on the Company's books, and the handsome shops present a busy appearance, even in these hot days. The following boilers, constructed at the instance of the named Companies, are now underway: Three boilers, each of 200 horse power, for the Boston (Mass.) Gas Light Company; 2 boilers, each of 300-horse power, for the Rochester (N. Y.) Gas Light Company; 2 boilers, each of 200-horse power, for the Metropolitan Gas Light Company, of Brooklyn, N. Y.; one boiler, of 200-horse power, for the Northern Gas Light Company, of New York city. In the meantime we might remark that visiting gas men are always welcome at the office and shops of the Hazelton Company.

THE water gas apparatus of the double super-heater Lowe type, contracted for some time ago by the proprietors of the East Chester Gas Company, of Mt. Vernon, N. Y.—this works and plant are now, however, under the control of the American Gas Company of Philadelphia—will be ready for operating by September 15th.

WRITING of the American Gas Company brings to mind the fact that the Company secured a great bargain when it purchased the works and franchise of the New Rochelle Gas Light Company, the territory around which is being rapidly taken up by suburban residences of the best type. New Rochelle, although one of the oldest towns in the State—it is beautifully situated on Long Island Sound, at a point some 18 miles northeast of New York city, and at the junction of the New York, New Haven and Hartford Railroad and its Harlem Branch*—only now begins to realize the advantages of its natural position; and it does not require any very great amount of real estate lore to cause one to positively assert that there is money for the dabbler in real estate at New Rochelle, which also means that there is profit, too, at New Rochelle for gas suppliers.

THE Carlisle (Pa.) Gas and Water Company has refunded its mortgage debt of $28,000, and secured an additional loan of $22,000, the increase to be applied to water works extension and the placing of an electric lighting plant.

THE proprietors of the York (Pa.) Gas Company are putting down an 8-inch feeding main to connect the holders at the site of the old plant with the holders at the new works.

THE Taunton (Mass.) Gas Company is putting mains through Highland street, from Winthrop street, west.

IT is authoritatively announced that hereafter the different Edison and Thomson-Houston Illuminating Companies will work in harmony; which means that the consolidation between these interests is now completed.

THE Toledo *News* says that the Gas Board, comprising the officials who have charge of the natural gas supply in that city, "is the only department of the city that shows a profit, or will ever show a net profit, and it is the one department that the plunderers of the taxpayers demand abolished."

THE new gasholder for the San Francisco (Cal.) Gas Company, the contract for which was awarded to the Union Iron Works, of that city, is rated to a capacity of 2,000,000 cubic feet. Another bit of work that Messrs. Crockett and Jones have underway is the putting down of 2¼ miles of 24-inch main, which is to run from the works at Bay and Buchanan streets to the intersection of Market street and Van Ness avenue.

THE capital stock of the Duluth (Minn.) Gas and Water Company now amounts to $1,000,000.

* This branch, by the way, was in charge of the late Major G. Warren Dresser, prior to the latter's connection with the JOURNAL, as constructing engineer.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

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AND GENERAL SCIENCE

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MONDAY, AUGUST 29, 1892.

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16 WALL ST., NEW YORK CITY.

AUGUST 29.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	117¼	—
Central	500,000	50	90	95
" Scrip	220,000	—	—	100
Equitable	4,000,000	100	153	155
" Bonds	1,000,000	—	106	108
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	110	115
Mutual	3,500,000	100	140	145
" Bonds	1,500,000	—	100	102
Municipal, Bonds	750,000		—	—
Northern		50	—	—
" Bonds	150,000	—	—	100
Standard Gas Co—				
Common Stock	5,000,000	100	35	—
Preferred	5,000,000	100	—	85
Yonkers		50	112	—
Richmond Co., S. I.	346,000	50	—	—
" Bonds	20,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	—	138
Citizens	1,200,000	20	113	113½
" S. F. Bonds	320,000	1000	—	103
Fulton Municipal	3,000,000	100	—	140
" Bonds	300,000		102	—
Peoples	1,000,000	10	94	—
" Bonds (7's)	368,000	—	100	—
" " (6's)	94,000	—	100	—
Metropolitan	870,000	100	—	118
" Bonds (5's)	70,000	—	100	—
Nassau	1,000,000	25	142	—
" Ctfs	700,000	1000	99	100
Williamsburgh	1,000,000	50	132	—
" Bonds	1,000,000	—	107	110
Out of Town Gas Companies.				
Boston United Gas Co.—				
1s Series S.F. Trust	7,000,000	1000	87½	88½
2d " " "	3,000,000	1000	77	78
Bay State Gas Co.—				
Stock	5,000,000	50	56	57
Income Bonds	2,000,000	1000	77	78
Buffalo Mutual, N. Y.	750,000	100	110	—
" Bonds	200,000	1000	95	100
Citizens, Newark	1,000,000	50	155	160
Chicago Gas Company.	25,000,000	100	82¾	83
Chicago Gas Light. & Coke Co.—				
G't'd Gold Bonds	7,650,000	1000	90½	90¾
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1000	—	97½
People's Gas and Coke Co., Chicago—				
1st Mortgage	2,100,000	1000	102	—
2d "	2,500,000	1000	101½	—
Consumers Gas Light Co., Jersey City	2,000,000	100	20	—
Bonds	600,000	1000	80	—
Cincinnati G. & C. Co.	7,000,000	100	192	—
Consumers Toronto	1,000,000	50	180	185
Central, S. F., Cal			90	—
Capital, Sacramento, Cal			58	
Consolidated, Balt.	11,000,000	100	61	—
" Bonds	6,400,000		107	107½
Citizens Gas Lt. Co., Rochester, N. Y.	500,000	—	85	101
Bonds	250,000		—	—
East River Gas Co., Long Island City	1,000,000	100	100	105
Bonds	500,000	100	100	102
Hartford, Conn	750,000	25	120	128
Jersey City	750,000	20	180	200
Louisville, Ky	2,570,000	50	125	130
Little Falls, N. Y.	50,000	100	—	100
" Bonds	25,000	—	100	103
Laclede Gas Light Co., St. Louis, Mo.—				
Common Stock	7,500,000	100	24¼	24½
Preferred "	2,500,000	100	65	66
Bonds	9,034,400	1000	83¾	84
Montreal, Canada	2,000,000	100	200	208
Memphis (Tenn.) Gas	750,000	100	40	—
" Bonds.	240,000	100	103	—
New Haven, Conn		25	200	—

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Three years' experience. Good bookkeeper. Best references.
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An Oil Tank,

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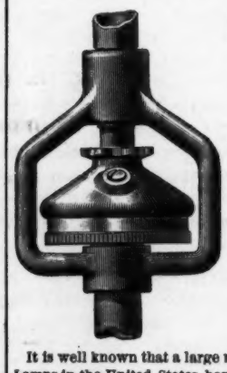

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I have decided to take orders for these Generators for the balance of this season at *one half the price of any other* Water Gas Generator of equal capacity now on the market. After that the price shall be raised. *Everything is guaranteed*, including durability and capacity of the Generator, the quality of the gas, and its cost.

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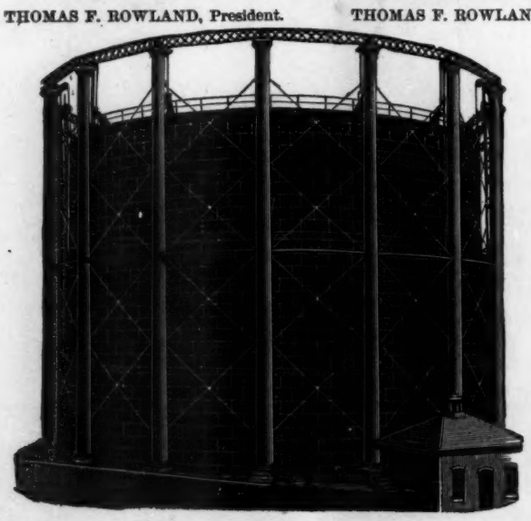

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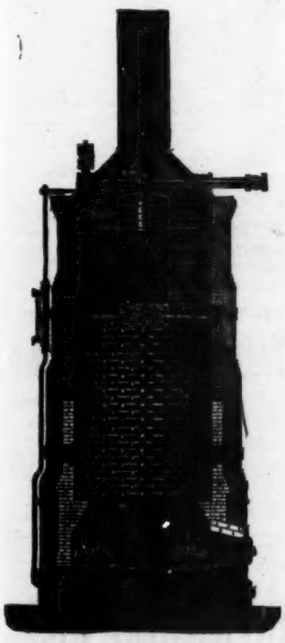

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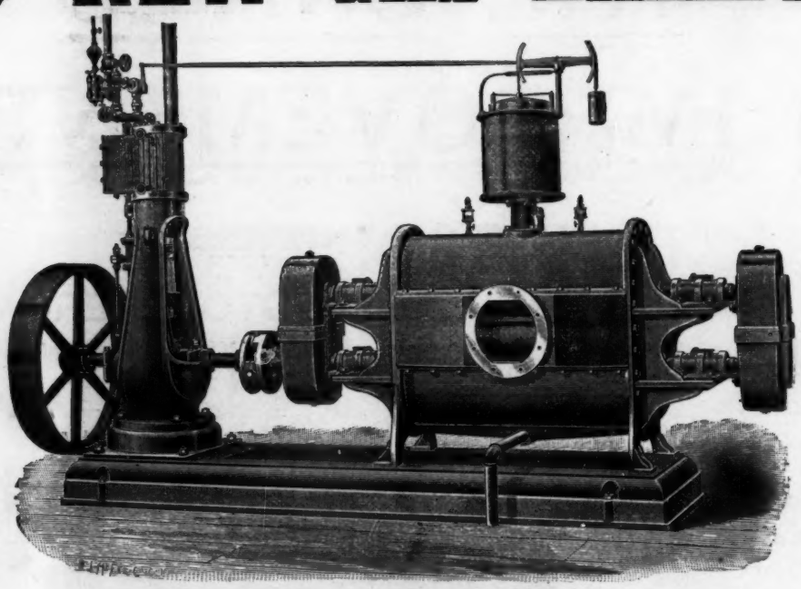

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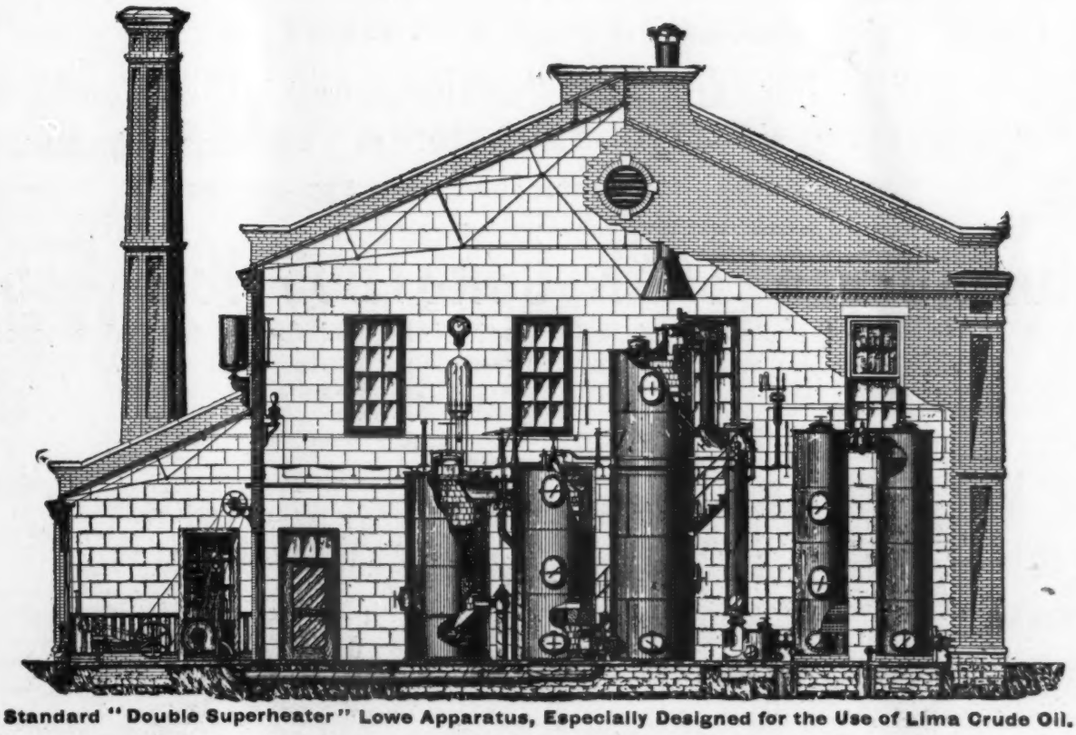

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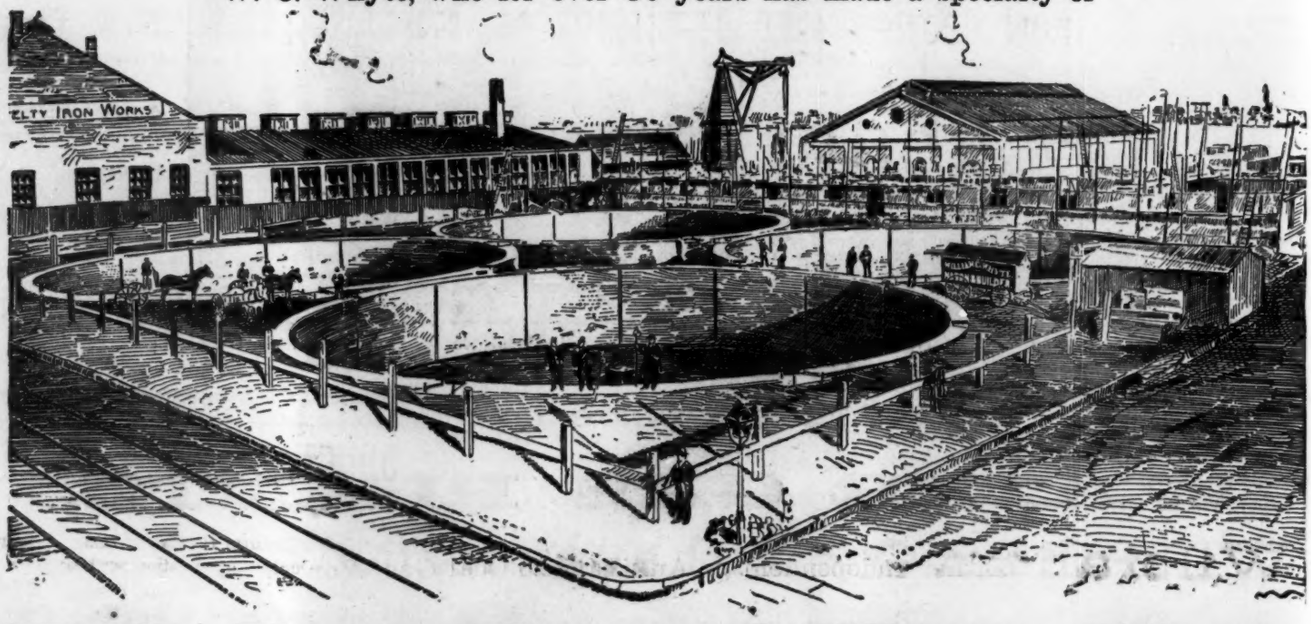

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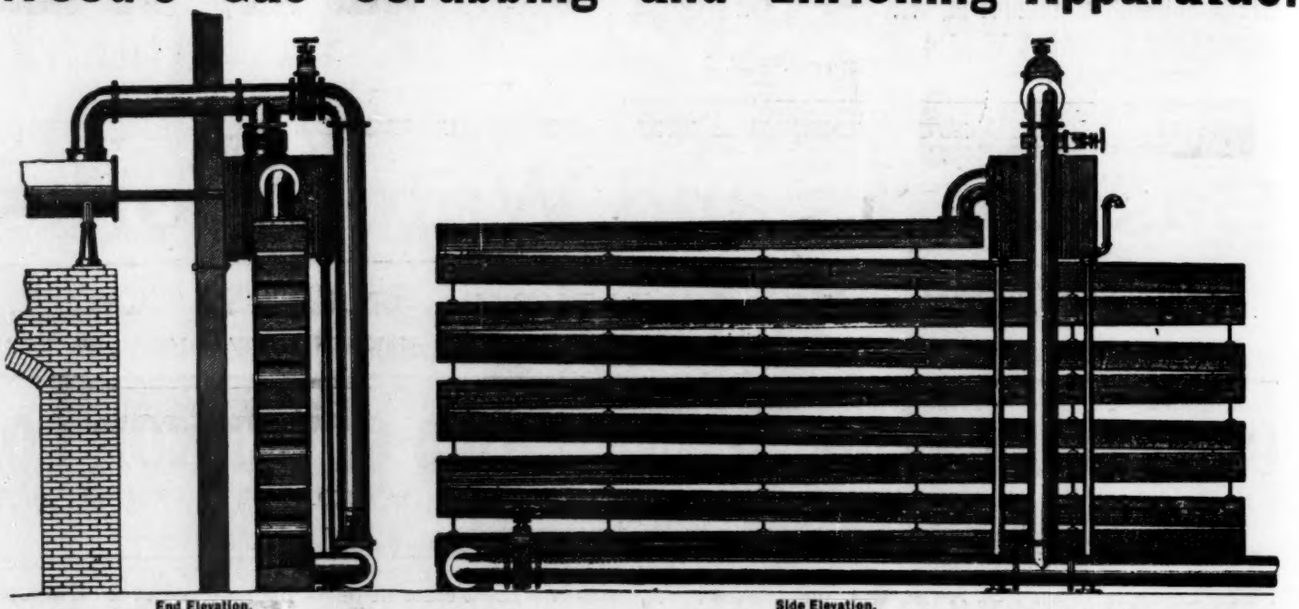

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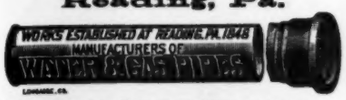

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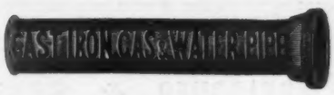

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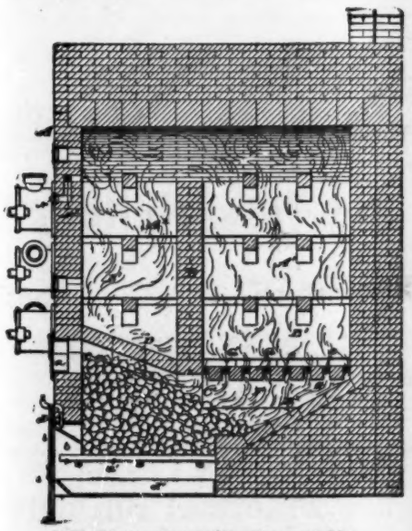

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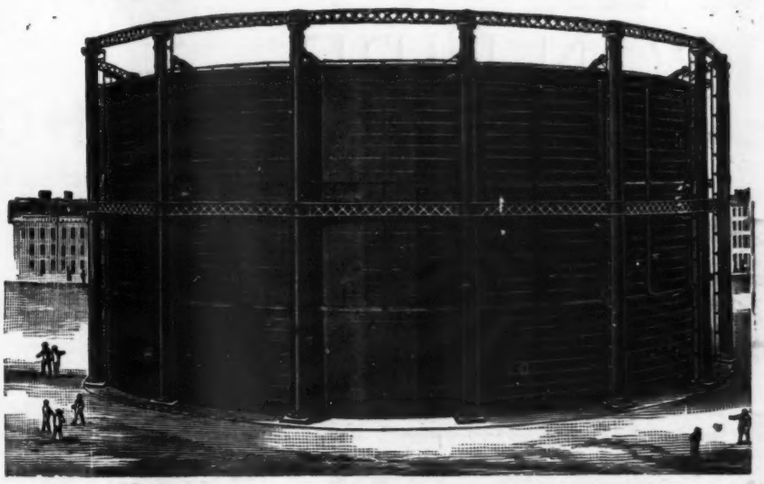

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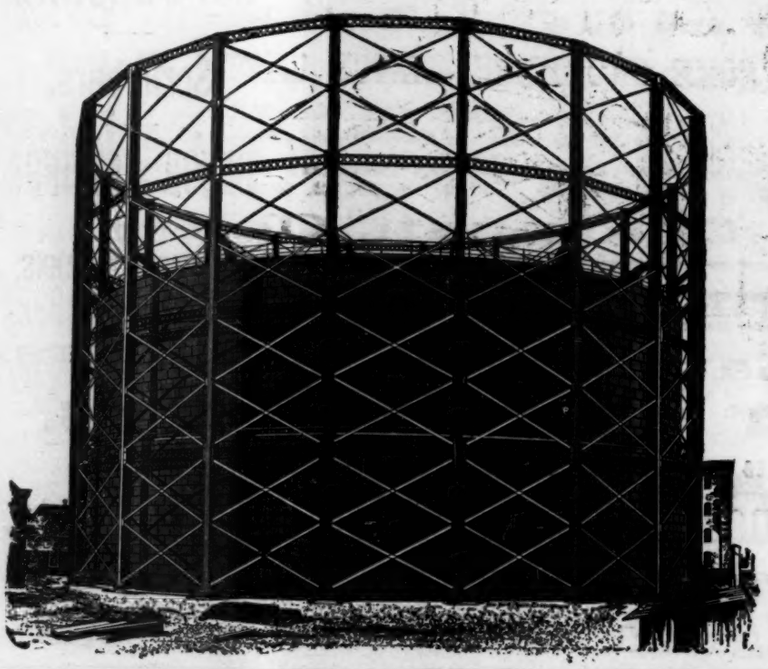

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